# Electrical Review

With Which Is Consolidated WESTERN ELECTRICIAN and ELECTROCRAFT.

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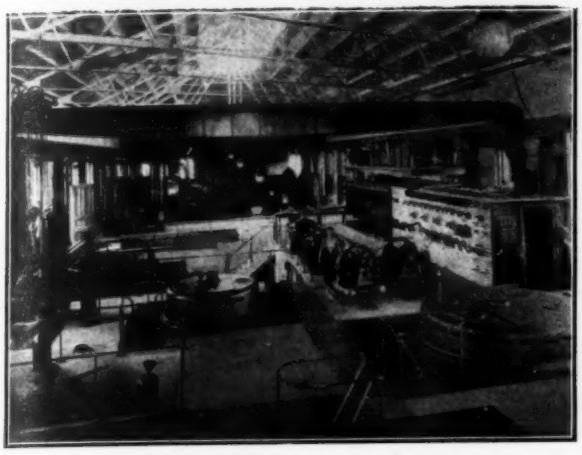
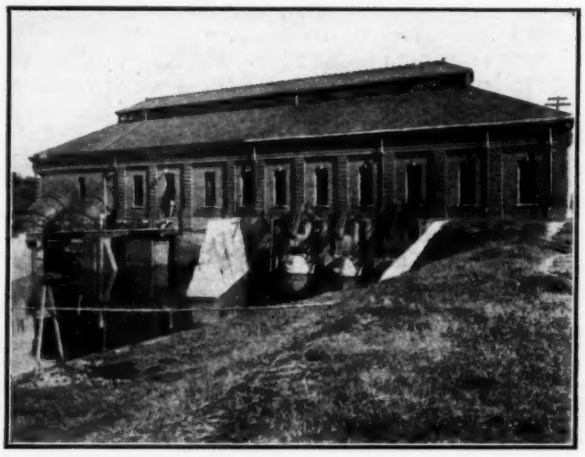




Interior and Exterior Views of Drainage Pumping Station at New Orleans.

# Electrically Operated Pumping System of New Orleans

## *Unusual Conditions Make Three Separate Systems Necessary—Details of Water, Sewage and Drainage Systems*

THERE are many unusual and interesting features connected with the municipal pumping system of the City of New Orleans, La., which characterizes it as one of the most comprehensive installations of its kind on record. Because of the peculiar conditions three entirely separate and distinct pumping systems are required. One is for the supplying of water, one for sewage pumping and one for surface drainage pumping. The drainage and sewage pumping systems are entirely electrical, as is also a considerable portion of the water-pumping system, although there are still in operation at the main water-pumping station a number of steam pumps.

Water for the City of New Orleans is taken from the Mississippi River and passed through a very elaborate filtering plant before being used.

The sewage is handled by automatic pumping stations, some of which are located underground, in which the pumps automatically start operating when the sewage has reached a predetermined level.

The surface drainage is carried off in canals and its removal presents a problem not met by any other city in the world. The ground is all absolutely level, with possibly not a difference of level of over 10 feet in the entire city. The area drained comprises practically 25,000 acres.

### DESCRIPTION OF SEWERAGE STATION.

The sewage from practically the entire city is collected by first small lateral sewers leading to larger submains, which in turn drain into the main sewer, but on account of the surface of the ground being very nearly flat it is impracticable to bring this sewer to a central point by a continuous grade. It was therefore necessary to build pumping substations along the line of the main sewer and in some cases on the submains also to lift the sewage from one level to another, so as to continue its course to the central point.

This central collecting point is designated as Sewerage Station A. The pumps at this station discharge the sewage through a 48-inch cast-iron force main about 7000 feet long, into the Mississippi River. This central pumping station takes care of the sewage from the northern half of the city.

The sewage from the southern half of the city is taken care of in Station B, whose pumps discharge it into the river through a 20-inch cast-iron force main, about 2000 feet long. The pumps in Station B and in all of the smaller substations are operated by electric motors, supplied with power from Station A, which is thus the central sewerage power station, in addition to the main sewage discharge station.

The boiler plant at Station A consists of four Heine water-tube boilers, each of 250 boiler horsepower rating, each containing 2500 square feet of heating surface. They are designed to carry 200 pounds of steam and are connected to the engines by means of a duplicate system of extra heavy steam pipes, designed so that no single accident to a pipe will cause the shutdown of more than one engine or

boiler unit. The boiler plant has shown excellent results in efficiency, averaging an evaporation of 9 pounds of water per pound of coal at 212 degrees on monthly averages.

Triple-expansion engines of the Corliss type are installed, each of which will develop under maximum conditions 800 indicated horsepower at a speed of 125 revolutions per minute. The generators in Station A are 3-phase, 25-cycle, 225-kilowatt machines and are controlled by a switchboard of the latest type. Current at 3300 volts from these generators is carried through lead-armored rubber-covered cables to various substations. The ducts in which the cables are laid are built on top of the sewer and the sewer manholes are used for outlets. The cables have never failed since the beginning of regular operation.

Station B, the largest of the substations, contains two 18-inch centrifugal pumps, directly connected to 100-horsepower, 200-volt vertical shaft variable speed induction motors of Westinghouse make. The pumps are designed to discharge 670 cubic feet per minute against a 44-foot head.

All the other substations are particularly interesting in that they are operated entirely automatically and without screening of the sewage, the motors being stopped and started by means of floats in the sewer. The stations are inspected daily and the starting devices maintained in perfect condition. These stations have operated with absolute reliability at all times and the saving to the city in labor alone has been a very considerable item.

All of the substations are similarly equipped with pumps driven by vertical-shaft motors of the induction type and controlled by automatic controllers, operate by a float.

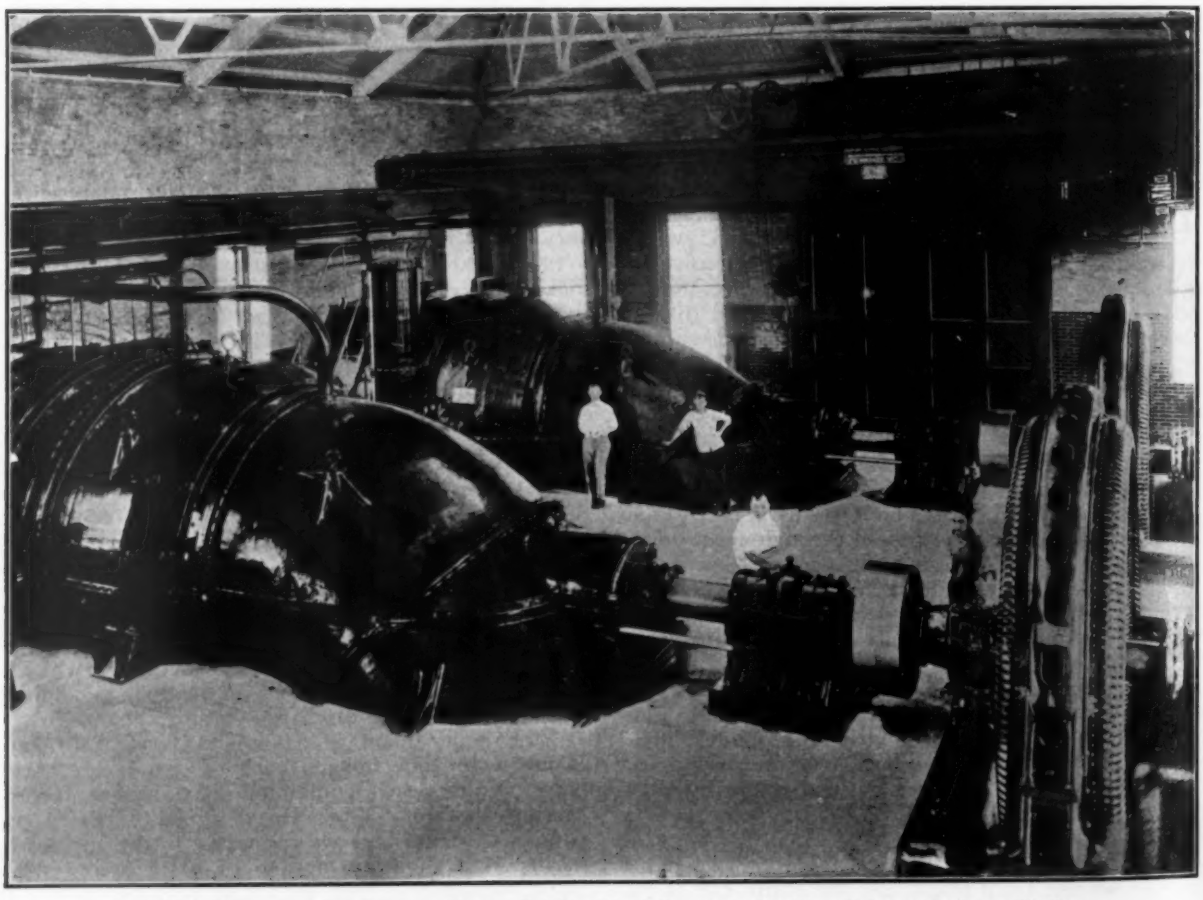
Motors are of 60-horsepower size of Westinghouse make, operating at what would generally be considered a low efficiency, but they were designed for severe service rather than high efficiency. They are slow-speed machines. An interesting point in this connection is that notwithstanding the low inherent efficiencies of the machines, they use considerably less power than the high-efficiency type.

Four of the stations are unique in that they are built entirely below the street level. These stations are as dry and fit for electrical apparatus as the above ground stations. They are kept white on the inside, a few incandescent lamps are left burning and a small ventilating fan is kept in operation continuously, which effectively drys out the dampness and prevents sweating.

All substations are provided with automatic bypasses at the level of the discharging side sewer, which would operate in the case of the failure of the pumps to start.

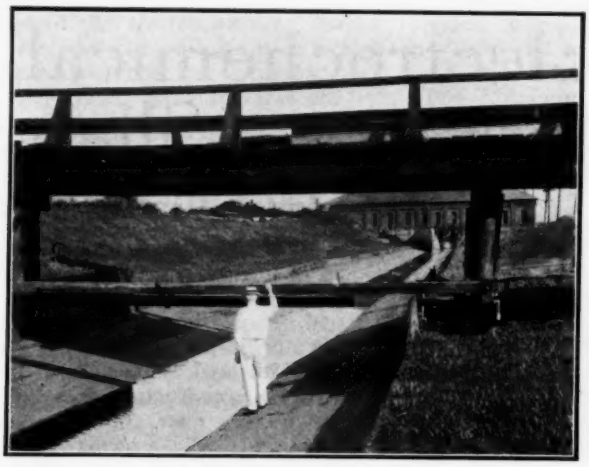
### Details of Waterworks System.

Water for the City of New Orleans is taken from the Mississippi River at the extreme upper end of the city, through a 48-inch suction line, about three-fourths mile long, which line is laid level and with its top two feet below extreme low water in the river. The intake is so arranged as to effectually screen out any large floating matter and to take the water always from near the surface, where the amount of mud, which it will carry, is a minimum.



Two 1200-Horsepower Synchronous Motors Driving Wood Pumps in the New Orleans Drainage Station.

Discharge Side of a Drainage Station.



One of the Drainage Canals.

Three 40,000,000-gallon low-lift pumps take water from this 48-inch suction line and discharge it through a 48-inch line, which enters the head house, which is the controlling center of the reservoir system and of the chemical and sedimentation treatment, which softens the water and prepares it for filtration.

In the course of ordinary operation it is necessary to lift twice all the water used by the city. The first lift is for sending the water through the reservoir system and is accomplished by any one of three centrifugal pumps, delivering 40,000,000 gallons in 24 hours against a total head of 25 feet, when running at a speed not greater than 210 revolutions per minute.

From the filters the water is passed directly to the clear-water equalizing reservoir beneath them, which connects with the clear-water well, whence the high-lift pumps take their suction. The passage from the time it is first discharged by the low-lift pumps, which take it from the river until it reaches the clear-water well in the same pumping station, containing the low-lift pumps, is continuous and entirely by gravity. The filters are automatically controlled in such a way that they can gradually increase or decrease their yield as the level of water falls or rises in the suction well, thus always tending to maintain a constant level in the well, or they can be set to yield at any constant rate desired from nothing to 6,000,000 gallons each.

Taking suction from the clear-water well, beside the four 20,000,000-gallon distribution pumps, which maintain the pressure upon the city mains, is a 20,000,000-gallon low-lift pump, which will send any surplus water into the clear-water storage reservoirs.

The city believes in metering and is one of the very few communities in the country whose services are 100 per cent metered. There are approximately 70,000 consumers.

### The Drainage System.

The City of New Orleans covers an area of about 37.5 square miles and including Algiers on the opposite side of the river, about 39 square miles. The land along the river front is higher than other parts of the city, the fall in the distance of about two miles being from 12 to 18 feet. The Mississippi River in flood season rises above its banks and is only kept from overflowing by the levees, which have been constructed along its bank. Lake Ponchartrain on the north also rises, when heavy winds prevail, as much as 4.5 feet above its normal level. This lake ordinarily is approximately one foot higher than the level of the city itself. New Orleans therefore is a huge basin, with a rim of earth around its outer edge to keep out the water. But this rim, while it prevents the water of the river and lake from getting in, also prevents the water of storms from getting out. It should be remembered that there is an excessive amount of rainfall in New Orleans, the normal figure being 56 inches per year. There have been falls of as high as nine inches in one day. The drainage problem is therefore a very serious one.

The problem has been solved by the construction of a main drainage canal, connected with numerous subcanals, which handle the daily flow and drainage from storms of moderate intensity only. All subcanals have a natural fall, which permits the water to flow through them to the main canal by gravity and at a velocity sufficiently high to prevent them from filling with deposit. They therefore not only deliver the water rapidly to the pumping stations, but are self-cleaning. The main canal, on the contrary, runs through what is practically a level country and since the surface of the ground through which the canal runs has no slope, it was necessary to construct the bottom of this canal on the incline. In addition there are five pumping stations located about two miles apart along the canal, thus dividing it into five sections, the function of each pumping station being to lift the water from the section of canal above it into the section of canal below it, thus creating a head and causing the water to flow rapidly onto the next section.

To drain the city in times of heavy storms this canal system has been so arranged that discharge can be made into either Lake Borne or Lake Ponchartrain. Normally surface drainage is discharged into Lake Borne, but the discharge into Lake Ponchartrain is much more direct, necessitating only two lifts, of from 7 to 10 feet each, and this system is used in emergencies. The various pumping stations are also interconnected to some extent, so that water can be transferred from one system of canals to another, in case of unusual conditions.

The drainage is handled by pumps of the screw type, designed by A. B. Wood, mechanical engineer, in charge of pumping stations. These pumps are capable of taking a 12-inch object through them and have been in operation for three years with not a bolt touched. These pumps are operated by 1200-horsepower slow-speed synchronous motors of Allis-Chalmers make.

# Electrochemical Development at Shawinigan

## *Hydroelectric Development of 500,000 Horsepower Opens Vast Electrochemical Industry in Canadian City—Additional Water-Power Development Contemplated*

THE importance of water-power development as a war measure is well indicated by the industrial activity that followed the construction of a hydroelectric plant at Shawinigan, Can., on the St. Maurice River. From an obscure village of a few inhabitants this community has developed into an important industrial community, known as the electrochemical center of Canada. H. E. Randall, electrochemical engineer of the Shawinigan Water & Power Company, recently presented facts and figures before the convention of the American Electrochemical Society indicating the remarkable growth that has followed the development of this water power.

Shawinigan is located in the Province of Quebec, Canada, midway between Montreal and Quebec City, and derives its name from the Indian word indicating the resemblance between their beautiful quill and bead work and the great Falls of the St. Maurice River.

The town is of comparatively recent origin, and until 1898 its entire population lived in one house. Then came the original power development, soon after the Canadian Northern Railway, then the Pittsburgh Reduction Company, then the Canadian Pacific Railway, and soon the wilderness of '98 became a thriving, progressive industrial city, with a population of 12,000 people, and manufactured products reaching the $20,000,000 mark in 1916.

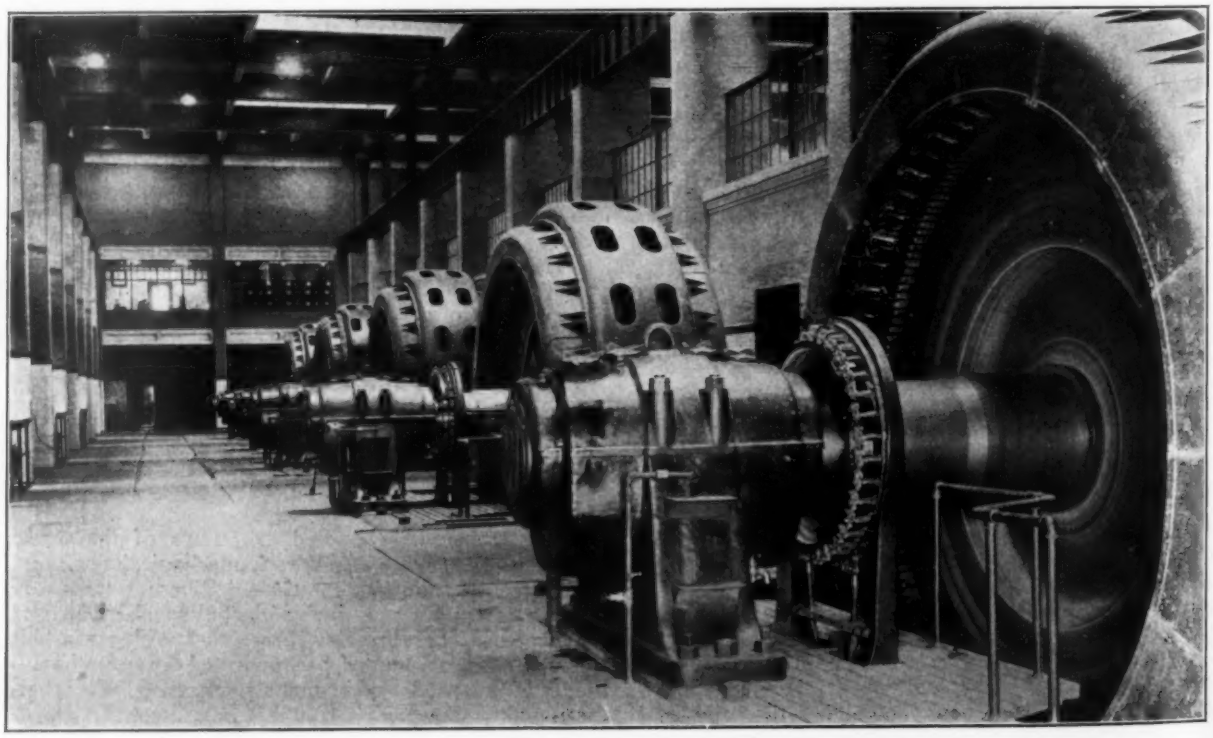
Shawinigan, with its two railroads, is within easy reach of the larger cities of the continent, being three and one-half hours from Montreal and about 15 hours from New York, Boston, Buffalo and Toronto. About six trains a day are available to each of these points.

### Power Supply.

The St. Maurice River, whose drainage area is upwards of 20,000 square miles, has a fall of 150 feet at Shawinigan. This fall has been utilized in the four power houses which now have an installed capacity of 196,000 horsepower. The latest power house at this development has five 20,000-horsepower units, and when constructed in 1910 represented a very big advance in hydroelectric practice.

Nine miles above Shawinigan the St. Maurice River falls 85 feet and there is located another power house with an installed capacity of 120,000 horsepower. The plans for this power house called for 60,000 horsepower of additional capacity, and during construction arrangements were made for the quick installation of this capacity, so that when needed it can probably be installed as fast as the load develops. This power house operates in parallel with the Shawinigan power houses, and it supplies the Shawinigan industries as well as feeding the general distribution system of the Shawinigan Company.

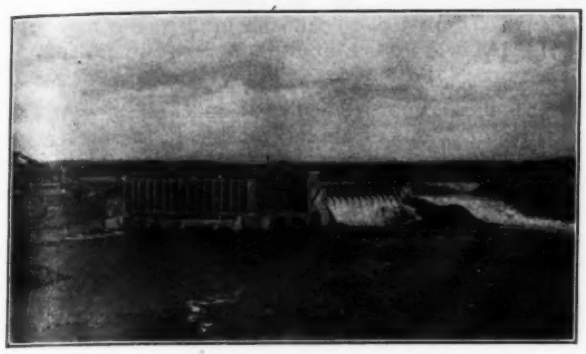
The Shawinigan Company owns the water rights and has plans under way for the development of about



New 100,000-Horsepower Plant of the Shawinigan Water & Power Company.

75,000 horsepower at the Gres Falls, four miles below Shawinigan on the St. Maurice River, where a head of 65 feet is available. In addition, within 100 miles of Shawinigan, there are other undeveloped water powers aggregating 300,000 horsepower.

Totaling the present developed and possible power mentioned above, the immediately visible supply of



One of the Four Plants of the Shawinigan Company.

power available for feeding the Shawinigan system amounts to 1,091,000 horsepower, of which 680,000 horsepower is yet unsold.

The amount of power which can be developed on the St. Maurice River is only limited by the amount of water and the falls available. No considerations of scenic beauty enter into the power situation, and since the entire St. Maurice water shed lies within the Province of Quebec it is reasonable to believe that no interference or abrogation of rights need be looked for. The broad general policy of the Province with respect to water-power development has been one of the outstanding features in the progressiveness of the Province. This policy is well exemplified in the construction of the largest storage reservoir in the world, on the upper reaches of the St. Maurice River, by the Provincial Government. The water thus stored is leased over a long period of years for use at times of low water to the various companies using it for power or other purposes. This storage reservoir, with a dam costing over $2,000,000, forms a lake 360 square miles in area, and impounds suffcient water to generate 1,000,000,000 kilowatt-hours in the power plants of Shawinigan. It is interesting to note that if the level of this lake were raised 6 feet, the water would commence to flow into the Arctic Ocean rather than into the St. Lawrence River.

Summarizing, it appears that there is now installed 511,000 horsepower of generating machinery feeding the Shawinigan system, and that there is now over 40,000 horsepower not used and available for immediate delivery, and an additional 60,000 horsepower will be available as rapidly as required. There is also 580,000 horsepower as yet undeveloped, and this with the 100,000 horsepower as yet unsold, makes 680,000 horsepower which is available for electrochemical industries in the St. Maurice Valley. This amount is almost wholly available for this purpose, because the growth of the heavy city loads outside the St. Maurice Valley will be amply taken care of by other power plants near the cities.

### Present Electrochemical Industries.

The Pittsburgh Reduction Company, now the Northern Aluminum Company, was one of the first industries to locate at Shawinigan. Its works are located near the power house, and are the only works not in the electrochemical district referred to later. American refined bauxite is brought in by rail and reduced to aluminum, between 50,000 and 60,000 horsepower being used for this purpose. The Aluminum Company also has a wire-drawing and cabling plant, and manufactures all the aluminum wire made in Canada. The works, which are quite extensive, employ some 500 men.

All other industries lie in the electrochemical district about two miles up the river from the power houses, and receive power at 25,000 to 50,000 volts.

The Canada Carbide Company occupies some 15 acres of land conveniently located between the Canadian Northern Railway and the Canadian Pacific Railway, with sidings to each. The company employs some 350 men, manufactures calcium carbide and acetylene gas only, and utilizes some 40,000 horsepower.

The Shawinigan Electro-Metals Company produces metallic magnesium in many forms, and occupies about five acres, with various processes. It utilizes some 2500 horsepower in both alternating and direct-current furnaces.

The Canadian Electrode Company manufactures the larger sizes of carbon electrodes, and has an output of about 15 tons per day. The majority of the output is used in Shawinigan, although a small tonnage is exported.

The Canadian Electro-Products Company manufactures acetic acid and acetone from acetylene gas supplied by the Canada Carbide Company. This plant has been put into operation since the war, and has become one of the large industries at Shawinigan.

The Prest-O-Lite Company operates a compressing plant for acetylene gas which it purchases from the Canada Carbide Company and which is distributed as dissolved acetylene.

Fraser, Brace & Company have an experimental electric furnace plant for the manufacture of various

Interior of 120,000-Horsepower Plant of Shawinigan Company.

kinds of steels and for general experimental purposes.

The latest addition to Shawinigan power users is the Canadian Aloxite Company, a subsidiary of the Carborundum Company, which will utilize over 20,000 horsepower.

While not electrochemical, two other industries in the Shawinigan district are worthy of mention on account of the large amount of power they consume. The Laurentide Company at Grand Mere, utilizing 28,000 horsepower for the manufacture of paper and pulp, and the Belgo-Canadian Company at Shawinigan, utilizing 18,000 horsepower for the same purpose.

# Merits of Oil and Grease Lubrication

## *Circulatory Free-Flowing Oil Gives Best Lubrication—Hard Oils and Greases Have Definite, Though Limited, Field of Usefulness—Characteristics of Greases*

By W. J. FOUHY

THE use of oils and greases as machine lubricants is as old as machine practice, but prior to the non-condensing steam engine, which came into practical use about the year 1800, machine practice was not extensive, and prior to the development of the petroleum industry during the last half of the nineteenth century, animal, vegetable and fish oils and greases were largely the only available lubricants. In fact, the development of this prime mover marked the beginning of an era of industrial advancement; subsequent machine development afforded a means for finding petroleum in abundance; the growing demand for machinery meant a corresponding demand for machine lubricants; the limited supply of the forementioned oils and greases meant a growing demand for petroleum oils and greases, and the development of machinery and of the petroleum industry kept pace with each other during the last half of the nineteenth century.

Machinery and petroleum lubricants are now used very extensively, but in view of the fact that these lubricants are not used efficiently in many instances, it is the writer's purpose to make clear the reasons why free-flowing oils are preferable to hard oils or greases under certain conditions from a lubricating standpoint, and to outline briefly the temperature, structural and operating conditions that justify the use of various greases. In fact, due to the small quantity of grease frequently required by some bearings easily lubricated with hard oil, many young enginemen, students and novices, receive the impression that suitable greases afford more efficient lubrication than well applied free-flowing oils. However, careful study of this problem reveals the fact that such impressions are erroneous and misleading in a great measure. In other words, a careful comparison of the composition and molecular construction of these lubricants and proper consideration of their differences in relation to the difference of power absorbed by "friction" make the error so clear that there is no room for argument.

### Advantages of Free-Flowing Oil for Lubrication.

As a matter of fact, every authority on lubrication, including Professor Thurston, and numerous experiments made by careful, experienced engineers, prove conclusively that exclusive grease lubrication involves from 3 to 5 per cent more power or "friction load" than suitable oil lubrication of the same assembly of machinery operated otherwise under precisely the same conditions.

Recognition of this advantage of free-flowing oils many years ago by some machine designers and builders, and their desire to build machinery superior to the output of competitors, prompted them to incorporate improved types of bearings in the construction of their output, and improved method of oil application, such as ball-race bearings, ring-oiling bearings, various types of oil-bath bearings, and oil-circulatory systems of much greater capacity. In fact, the adoption of these improvements of machine design and improved methods of application meant the prevention of unnecessary oil leakage, more cleanly machinery, more dependable lubrication than afforded by the oil-cup feeding and hand oiling, recovery and repeated use of each filling of oil, and an appreciable reduction of lubrication and other operating costs.

Furthermore, we find that the more copious supply of oil afforded working surfaces of bearings by these improved methods of oil application also reduces friction as much as 4 per cent more in many instances, especially when supplied under pressure from large circulatory systems. In view of this, it is fair to say that grease lubrication involves fully 5 per cent more friction than oil lubrication of improved modern methods.

### Testing of Friction Load.

A common way to determine the friction load of an assembly of machinery is to take power readings while it is running empty or without load, at rated speed. This is accomplished with reciprocating engine-driven machinery by taking correct indicator cards during such an interval, and computing the horsepower developed. With electric motor-driven machinery it can be determined by taking proper switchboard or portable wattmeter readings during such an interval, and by computing the kilowatts or horsepower required. However, a less expensive and more accurate method of determining the difference of "friction load" or of the power required with the respective lubricants, is to find their "coefficients of friction" by testing them on a modern friction machine.

The superiority of free-flowing petroleum oils as lubricants, or their lower coefficient of friction, is due to their fluidity, and high degree of purity. In other words, these characteristics embrace a molecular construction of hydrocarbons that afford lower coefficients of friction or less internal or molecular resistance than hard oils or greases. Another point of superiority of free-flowing oils is their great durability; that is to say, their fluidity and purity enable them to be readily recovered, filtered, and used over again repeatedly on the same working surfaces without danger of injuring bearings and increasing friction. In fact, in some instances, good, free-flowing engine and machine oils are used over and over again as many as 14,000 times in modern circulatory systems before their lubricating qualities become appreciably impaired. However, this endurance of oil is possible only in cases where such lubricants do not come in contact with critical temperatures, and other injurious influences during service.

### Field of Usefulness of Hard Oils and Greases.

On the other hand, hard oils and greases, otherwise known as semifluid, and solidified oils, have their proper realm of usefulness or afford dependable lubrication when used in their proper places, and when

rightly applied. As a matter of fact, experience teaches that there are prevailing structural and operating conditions, such as certain types of bearings, the presence of grease-feeding appliances, heat conditions and exposure of bearings to excessive dust and grit, which make it impossible for free-flowing oils to lubricate as economically and efficiently as semi-fluid and hard oils, and that justify the use of solidified oils even with an expense or loss of power.

Such is the case to a limited extent at many cement plants, collieries, ore mills, sugar plants, cotton-seed oil mills, and other industrial establishments. The actual conditions that make grease lubrication desirable at any plant are excessive surrounding and bearing temperatures, exposure of bearings to excessive dust and grit, the presence of grease cups, and other structural and operating features referred to later. In fact, temperature, structural and operating conditions are so extensive as to require a number of various greases.

### Composition, Grades and Uses of Hard Oils and Greases.

Hard oils or greases consist of lubricating oil, and some animal or vegetable product treated in such a manner as to form a sponge or filler capable of absorbing the oil constituent, but some greases are made almost wholly of animal fats for special purposes.

There are several grades of petroleum greases and the manufacturers usually make each grade of two or more consistencies. For instance, there are low, intermediate and high-melting-point greases of various consistencies for bearing service; special tallow compounds for locomotive service; and more adhesive greases for open gear service, chains and the like. As a matter of fact, each grade has several melting points, each consistency of each grade has its respective melting point, and all responsible manufacturers of lubricating greases rigidly maintain the uniformity of each grade and consistency.

Furthermore, for marketing conveniences, each grade has a trade name, and each consistency of each grade or brand also bears a number or some other means of identification in order to place consumers and marketers of these products in position to choose and use them intelligently in accordance with their structural, temperature and operating requirements.

Generally speaking, the quality of a grease depends on the quality of its oil constituent. Some grades or brands of grease contain different lubricating oils than others. The softer the consistency of a grade of grease, the more lubricating oil it contains, and the harder consistencies of any grade of grease are usually better suited for high-temperature service than the semi-fluid and softer consistencies of the same brand.

Referring specially to the grades of grease intended for bearings—the semi-fluid and soft consistencies are well adapted for several types of close-fitting machine bearings not subject to high temperatures, whether operated at high, intermediate or slow speeds. For instance, ordinary solid and split bearings equipped with properly adjusted spring compression cups; ordinary bearings with pockets affording a large area of journal surface, and roller bearings of mine cars, automobiles and other mechanisms. They are also well adapted for gear-case service where the containers are not reasonably oil-tight. This of course is true in every instance where either the clearance space, or the oil grooves are ample to afford proper distribution of lubricant to the working surfaces without promoting excessive leakage, and where the running and surrounding temperatures are not sufficient to cause excessive waste of grease.

However, in every instance of soft-grease lubrication where excessive waste of lubricant prevails, due either to constant high temperatures or to excessive clearance caused by abnormal metallic wear or otherwise, it is advisable to use either the medium or harder consistencies of the same grade, if prevention of previous waste is desirable. In fact, in some instances even a consistency of another brand of grease of higher melting point may be required.

The medium and hard consistencies of the low and intermediate-melting-point grades of grease are also well adapted for the lubrication of ordinary wrist pins, crank pins, eccentrics, knuckle joints and like moving parts, whether or not exposed to excessive dust and dirt, where the motion is such that free-flowing oils cannot be applied adequately, easily and safely without special oiling appliances.

The hard consistencies of each grade of grease of low and medium melting points are well suited and intended for bearings where the temperatures are excessive for the softer consistencies. They are desirable lubricants for bearings where the temperatures are sufficient to melt them at the required rate, and in many instances they are well suited for large, slow-speed, heavy-duty bearings.

The high-melting-point greases are well suited and intended for bearings where the room or surrounding temperatures are excessive for the hard consistencies of the medium-melting-point grade of grease. They are best applied either from large bearing pockets, or when fed from the locomotive type of grease cups.

The marked distinction of the high-melting-point greases is that their sponge is manufactured in a manner to resist greater or more intense heat than that of the medium grades. However, regardless of the grade and of the consistency of a grease, it is the oil that lubricates, and heat of working surfaces equal to its melting point is required to make it sufficiently fluid to liberate the oil constituent, before adequate lubrication can be obtained from it. This fact, which embraces the molecular construction of hard oils, is accountable for their higher coefficient of friction.

### Some Advantages of Greases.

On the other hand, one of the advantages obtained in practice by the proper application of suitable greases on bearings exposed to excessive dust and grit, is that these harder lubricants completely fill the clearance spaces, prior to melting, and they form a slight fillet at the bearing ends, which prevents dust and grit from entering, and thereby increasing friction and injuring the working surfaces, thus protecting these surfaces from foreign matter, as well as affording dependable lubrication.

The advantage obtained by using suitable greases instead of free-flowing oils on bearings subject to high temperatures, is simply the economy of lubricant attained by the prevention of waste of free-flowing lubricants. However, this advantage can be easily reversed in cases where the construction of such bearings is favorable to adequate oil recovery, where they can be supplied from a circulatory system, and where the construction and capacity of the system can be made suitable for required oil cooling. In fact, in such instances, it is advisable to use heavy-bodied free-flowing oils instead of grease, providing the maximum temperature of the working surfaces does not greatly exceed 150 degrees Fahrenheit.

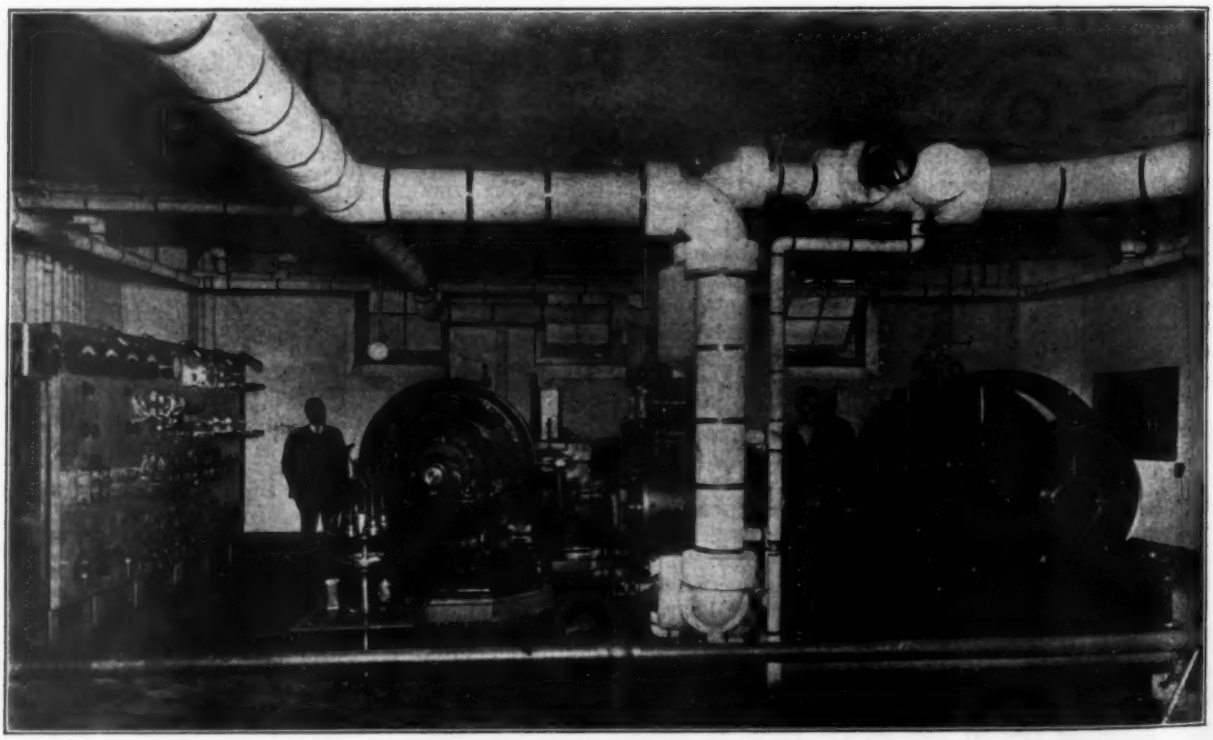
# Electricity in a Modern Hospital

## *Blodgett Memorial Hospital at Grand Rapids, Mich., Equipped With Latest Types of Motor-Drive Machines—Signal System a Feature*

THE equipment of Blodgett Memorial Hospital, Grand Rapids, Michigan, provides for the applications of electric power in a wide range of uses. This is a new institution which stands as an expression of the latest and best in modern hospital facilities. Electrical energy, which is made to serve in varied utilities, is generated by a steam-electric plant in the sub-basement. The steam plant consists of two boilers, each of 150 horsepower, of the Fitzgibbon marine type. They are equipped with Jones automatic, underfeed stokers and McDoud water-feed regulators. Coal is brought from the bins in a bucket suspended from a trolley that travels upon a monorail track; the bucket, which holds 700 pounds of coal, is discharged into the stoker hopper by a tilting motion. In an adjoining room are two Ball slide-valve engines, 150 and 100 horsepower, respectively. The larger engine is direct-connected to a Fort Wayne 100-kilowatt, direct-current generator, operating at 115 volts, and at a speed of 250 revolutions; the smaller engine drives a 50-kilowatt direct-current generator, at 115 volts, and at 250 revolutions.

A Spencer turbine vacuum cleaner, operated by a Westinghouse direct-connected vertical motor of 25 horsepower, at a speed of 3400 revolutions, serves the entire building of six to eight stories. The 5-panel switchboard, 6 by 24 feet, is equipped with Wagner instruments, including circuit-breakers connected to power lines. The 34 direct-current motors, mostly the Crocker-Wheeler type, range in capacity from 25 horsepower down to one-half horsepower. The four 25-horsepower motors are utilized as follows: One, belt-connected to the stokers; two, direct-connected to two Sturtevant ventilating fans, and running at a speed of 250 revolutions; one connected to vacuum cleaner, above referred to, which runs at a speed of 3400 revolutions. The laundry machinery, installed in first basement, is driven by 12 direct-connected motors, each of three horsepower; each machine is started and stopped by push-buttons. Sewing machines in the sewing room, and meat choppers and other kitchen utensils are operated by small motors. Electric stoves are provided in the diet kitchens, used in preparing food for invalids, as well as an electric heater in each operating room. In the latter rooms small motors are employed for fans, for surgeon's pumps used in administering ether, etc. Electric current is also applied in the surgical department for drilling through bones, and sawing. In the department devoted to eye, ear and throat ailments, is a specially constructed switchboard, connected both with the regular circuit and with a 16-volt storage battery, with rheostat control. The connected arrangement is such that the physician may bring into use a current of any required voltage from that required in a diminutive lamp for an observation in the throat to a 250-watt nitrogen lamp for a stronger and wider range of light.

Another interesting feature of the electrical equipment in the operating rooms, is a Westinghouse motor-generator set for producing alternating current. This



Generating Room at Blodgett Memorial Hospital, Grand Rapids, Mich.

is passed to a special transformer by which the current may be stepped up to 50,000 volts for use in the X-Ray machines.

The electric call system for nurses is considered faultless in practice. A button pushed in a patient's room flashes a light over the door of that room, and flashes the number of the room at the desk of the head nurse. This signal is not released until a nurse enters the patient's room and pushes it off. When an emergency button is pushed in a room, green signal lights are flashed—one over room from which the signal came, one at the end of each corridor and another at head nurse's desk. All these signal calls are automatically recorded, including time of calls, by a recording device. In this system, current at 115 volts from regular lighting system is employed. Two passenger elevators and one for freight are each operated by a direct-connected motor; two dumb-waiters, electrically operated, and having push-button control, are run from the general diet kitchen to serve the different floors. There is a time system, with two clocks on each floor. These are controlled by a master clock, all being operated through a 16-volt storage battery of eight cells, supplied by the Electric Storage Battery Company, Philadelphia.

The steam-heating plant is an adaptation of the Almirall system, in which exhaust steam from the engines is passed into heating tanks, thence through the pipes and heating coils, at one pound pressure during the coldest weather. All radiators have the Johnson thermostatic control equipment. Drinking water is supplied from the city system. For ice-making, the York absorption system of refrigeration is in use, whereby the brine is cooled and pumped to ice chests on the several floors. W. G. Campbell, electrician and chief engineer, has charge of the electrical and mechanical equipment. The electrical installations were made by the Roseberry-Henry Electrical Company, Grand Rapids.

### Activities of Lynn Section A. I. E. E.

On December 12, John B. Taylor, General Electric engineer at Schenectady, delivered an address on "The Phonograph" and reviewed the fundamentals of sound, speech and music and traced the development of the modern phonograph. Lantern slides showed in an effective way the principles underlying the reproduction of sound, and various models were used by way of illustration.

Chairman Davis announced that the next lecture would be one on "Submarines," and the inventor, Simon Lake, would be the speaker.

Great credit is due the present officers of the Lynn Section for bringing the membership up to what is believed to be the highest of any section in the country, and also for their successful efforts in securing talent for entertainment and instruction. The present membership of the Lynn Section is 1609, and the attendance at the meetings is uniformly large.

### Largest Electric Sign Installed at Trenton.

What is said to be the largest electric slogan sign in the world has been constructed at Trenton, N. J., and spans the Delaware River. The sign is 420 feet long and proclaims the fact that "Trenton Makes—The World Takes." The sign was built by one of the largest outdoor-advertising concerns in the East, and the power to maintain it will be supplied by the railway company of that city.

## CENTRAL-STATION DEVELOPMENT IN HOLLAND, MICH.

**Power Load Aggregates 2500 Horsepower—Details of Power Plant and Pumping Station.**

Manufacturers of Holland, Mich., with but few minor exceptions, all have been converted to the use of purchased power, with the result that the local electric light plant operates at a high load-factor and the various manufacturers are enjoying many economies which in these days of high fuel and labor costs mean so much.

The power plant is municipally operated and is in charge of R. B. Champion, Superintendent of Public Works.

The electric power sold, to drive motors in factories and shops, including the city's own pumping plant, amounts to 120,000 kilowatt-hours per month. Of the 2878 meters in service, 103 are for motors. There are 60 outdoor transformers in service for lighting and 61 power transformers, all this equipment belonging to the city. Among the larger users of motor power in Holland are the Holland Shoe Company, H. J. Heinz Company, Western Machine Tool Works, Buss

Generator Room at Holland Plant.

Machine Works, Holland Furnace Company, and about 12 others of smaller power consumption. The entire factory consumption of Holland for the year ended in March, 1917, was 1,243,510 kilowatt-hours; the year following that period will show a considerable increase. Current is generated at 2440 volts, this being stepped down to 220 volts for motor use. The motors for all purposes in the city, including those required for municipal pumping, aggregate about 2500 horsepower.

The steam plant consists of four Stirling water-tube boilers of 290-horsepower each; two duplex and two single-stroke feedwater and heater pumps. The electric generating equipment comprises two Allis-Chalmers turbogenerators, one of 500 kilowatts, with a motor-driven jet condenser, and a 15-kilowatt engine-operated exciter; the other of 1000 kilowatts, with Worthington surface condenser and steam-turbine-driven hot-well pump, engine-driven circulating pump, steam vacuum pump, and motor-generator exciter set; the third unit consists of a Westinghouse 300-kilowatt, revolving-field generator, direct-connected to an 18 by 32 by 24-inch, cross-compound condensing engine, with a jet condenser, and a 12-kilowatt engine-driven exciter. The generators are all alternating-current machines. The plant is equipped with oil switches and

automatic feeder-voltage regulators of General Electric manufacture.

The switchboard apparatus, mounted upon a Vermont blue marble board, comprises five panels for exciters, four for the generators, four lighting panels, three for power circuit, two double arc panels, and six blanks for additional power. The busbar construction is all in the basement, there being a knife-switch for each outgoing wire.

Illustrations herewith show the generating machinery, switchboard panels and busbar construction. The remote-control field rheostats are in the basement. The gallery, above switchboard, contains a series of transformers on outgoing lines, potential transformers, choke coils and lightning arresters, and single-phase feeder voltage regulators. The generator department is equipped with a 15-ton traveling crane for handling heavy parts.

### Pumping System.

The pumping system is ample for the city's water supply and for fire protection. Water is pumped from two or three groups of wells by centrifugal pumps, operated by 75-horsepower motors, with the exception of one pump, which is driven by a 50-horsepower motor; and all pumps and motors are direct-connected. The pumping equipment is as follows: Two 1150-gallon, single-stage, centrifugal, American Well Works pumps; three Platt Iron Works centrifugal pumps, each of 1100 gallons capacity. These pumps deliver water direct into the mains; there is an excess volume, however, that is pumped into a standpipe, 18 feet diameter by 130 feet high, of the capacity of 247,000 gallons, for use in case of fires. A new reservoir has just been built of reinforced concrete, of a capacity of 1,000,000 gallons, which is to serve as a reserve supply for fire protection, and which will be filled by pumping from the wells. In addition to the electric-driven pumps above noted, there is a Laidlaw-Dunn-Gordon steam fire pump of 2,470,000 gallons capacity per day; the motor-driven pumps have a combined gallon capacity in 24 hours of 7,696,000.

Incidentally, it may be noted that the boilers are being equipped with steam-flow meters and draft meters.

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## Court to Decide Who Shall Pay Record Cost in Commission Cases.

The Commissioners of the Illinois Public Utilities Commission have been placed in contempt of court in a friendly suit before the Circuit Court of Sangamon county, Illinois, in which county Springfield is located. This contempt of court suit will be in force until the Illinois Supreme Court has made a decision whether a party taking an appeal from the Commission to the Circuit Court shall pay to the state the cost of preparing the record. The question is not a new one and has been in controversy for two years. The Commissioners were before Judge E. S. Smith in response to a citation for contempt following their refusal to file the record in a case in which the cost of preparing the record had not been paid. The Commissioners were fined $25 and costs, payment being suspended pending the appeal to the Supreme Court.

The Commission bases its demands for payment on Section 7 of the Public Utility law which provides that the Commissioners shall charge and collect "the following fees," after which statement the amount of fees for various documents is set forth. No exceptions are made in this section except provision that no charges shall be made for copies of papers furnished to any city or public officers for use in their official capacity. Section 68 provides upon filing of notice of appeal the Court shall file with the Circuit Clerk a certified copy of the record of the Commission. In the matter of the appeal of the Springfield Gas & Electric Company from an order of the Commission filing rates for gas services the company contested the payment of the fee for preparing a record amounting to several hundred dollars. The court required the company to deposit in a bank designated by the Court the amount of the fee, pending a decision upon the point and the record was then filed. Since then the payment of fees has been guaranteed in several instances contingent upon the decision in the Springfield Gas & Electric Company case. All appeals from the Illinois Public Utilities Commission are taken to the Circuit Court of Sangamon County.

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**New York Section of National Electric Light Association Meets.**—The November meeting of the New York Companies' Section of the National Electric Light Association, held November 20 in the Fifteenth Street Auditorium, New York City, broke all records as to attendance, between 400 and 500 men and women having gathered at the opening hour. W. H. Whitton, of the New York Edison Company, read a most excellent paper, with discussion by J. A. F. Randolph and A. F. Berry, its subject being "Real Estate and the Central Station."

Front View of Switchboard.

Alternating-Current Bus Structure.

# Editorial Comment

## *Caution as to "Lightless" Nights*

BY AN ORDER issued on December 14 by Dr. Garfield, head of the Fuel Administration, the curtailment of outdoor electric lighting provided for in the original order of five weeks earlier has been greatly extended twice each week so as to make Sunday and Thursday nights practically "lightless" nights. As pointed out in the news section of this issue, the new order is even more far reaching in that it provides also for the restriction of considerable interior lighting not necessary for safety or the conduct of needful business.

The electrical industry, of course, will adjust itself to the new regulations because it hopes to maintain its leadership in loyal co-operation with the Government in every measure deemed necessary to successful prosecution of this gigantic war. The carrying out of the new order involves no little difficulty in adjusting lighting contracts already interfered with by the earlier order; this and other difficulties will be overcome, however, as have countless other and even more serious tribulations since we entered the war.

In some quarters the enthusiasm in putting the new restrictions into effect is not very keen, it being felt that electric lighting is being singled out for curtailment, whereas other lighting is not affected. This is no important objection, however, rather is it an acknowledgment that other forms of lighting are so insignificant in extent as to count for but little. It can be taken for granted that the federal authorities do not intend to be discriminating. They have perhaps justly felt that unrestricted maintenance of the spectacular lighting of "Great White Ways" is not only not in keeping with ideas of war-time economy, but is apt to minimize the popular conception of the seriousness of the war. In fact, Dr. Garfield is quoted as stating he hoped the additional curtailment of lighting would result not only in greater fuel economy but also in impressing on the public the gravity of the nation's present chief business.

It was probably with less forethought that he advocated a similar curtailment of lighting in all homes. We cannot believe that the nation is in such dire straits as to necessitate such radical advice. The fact is that in probably over 90 per cent of American homes there is no superfluity of lighting; indeed, in doubtless the majority do we still find entirely inadequate lighting and prevalence of the common custom of turning off all lights in rooms not actually occupied. The evil effects of poor lighting are seen in the impaired vision of thousands of children before they have taken up factory or office work. In the home, at least, let us have the wholesomeness and cheer afforded by good lighting, especially if gloom is to prevail outdoors. Waste should be eliminated, of course; one of the most effective ways of doing it is to secure the replacement of the old and wasteful carbon-filament lamps by efficient tungsten lamps, that is, reduce not lighting but the energy now largely wasted in inefficient lighting.

As regards outdoor lighting, an important caution is that the street lighting be not reduced below that absolutely necessary for the prevention of accidents and the encouragement of footpads and highwaymen. With the present violent wave of crime in many cities it is to be remembered that every electric street light is as good as a policeman. The great majority of American streets are far from being adequately lighted for safety considerations alone, therefore an indiscriminate reduction of outdoor lighting is by all means to be deplored.

## *Railway Control and the Capital Involved*

THE immense amount of capital and the economic changes that would be involved in complete governmental ownership or control of transportation lines may be shown by the fact that the cost of the railways of the world, including in this term first construction and equipment, is estimated at about $60,000,000,000. Of this the lines in Europe represent about $27,000,000,000, North America $21,000,000,000, South America $3,500,000,000, Asia $4,500,000,000, Africa $2,000,000,000, and Oceania $1,500,000,000.

These figures also lend interest to a compilation recently made by authorities which reveals the fact that about one-third of the railways of the world are already owned or controlled by the governments of the respective countries or states in which they operate, and that in Europe, Asia, Africa and the British colonies more than one-half of the lines are government owned or controlled.

In some cases, notably Germany and Australia, the railways are chiefly the property of the states or subdivisions forming the general government; in others they are the direct property of the government. In Germany over 90 per cent of the railways are classed as state railways, Austria-Hungary 82 per cent, Russia 77 per cent, Italy 73 per cent, Switzerland 99 per cent, the Scandinavian states 44 per cent, and France, under present conditions 17 per cent, while other parts of its systems have been built in part or whole by the government and will later revert to it. In Europe, as a whole, about 53 per cent of the railway lines are classed as governmental railways, Asia 70 per cent,

Africa 65 per cent, South America 31 per cent and North America but 5 per cent. In Australia 99 per cent belong to the dominions which form the Commonwealth, in New Zealand 99 per cent are governmental, in India 80 per cent and in the British colonies as a whole, 55 per cent; while of those in Great Britain none is state owned, though the entire system is now temporarily controlled by the government for war purposes. In Canada about 5 per cent of the railways are government owned, and control is being extended to all others. In certain of the South American countries, notably Argentina, the share of the lines owned or controlled by the government is comparatively small, although one of the lines in Chile is an important exception.

In China portions of the railways are being constructed under arrangements which will finally make them government property, and in Japan 79 per cent of the railways are now classed as government lines. The principal countries which do not own any part of their lines are the United States, Great Britain, Spain and Turkey.

Another aspect of the problem is the undoubted very extensive electrification of steam railroads to be undertaken not long after conditions return to normal on the cessation of the war. This will involve considerable additional capital outlay. How can this be provided on top of the enormous capital the Government would have to raise to take over the lines? In view of the prodigious financing required to carry on the war, is it not chimerical to suggest further extension of government burdens?

These figures are all of practical interest, even from the American standpoint, for the reason that railway control is an international question. Action in one important country inevitably leads to similar action or reactions in other countries, and capital itself has become so much a common factor in all of the transactions of the world that it must henceforth be considered as wholly international. These are all considerations that give force to the familiar injunction at the grade crossing, "Stop, Look & Listen."

## *The Sign-Lighting Question*

ALWAYS loyally supporting the Government in every way possible, the Commonwealth Edison Company of Chicago co-operated promptly with Fuel Administrator Garfield in his order prohibiting the use of coal for the operation of electric signs except between the hours of 7:45 and 11 p. m. Copies of Dr. Garfield's circular were mailed to about 12,000 sign users in the Chicago district and the work was done by a number of volunteers from different departments of the company who worked late at night in order to get the notices mailed in time.

In relation to this curtailment of sign lighting, Dana H. Howard, superintendent of advertising for the Commonwealth Edison Company, remarks that some fractional part of one per cent of the company's consumption of coal will be saved but that there is a question in his mind whether it is better to save this slight amount of coal at the expense of the equanimity and cheer of the people at home whose boys are fighting for Uncle Sam. Mr. Howard says that Harry Selfridge of London in a recent article in the *Saturday Evening Post* declared that his stores never did so much business in their history as they have done during the last year. In the United States electrical advertising, according to Mr. Howard, is about the most inexpensive medium that the manufacturer and merchant has at his command today to keep business moving.

## *Safeguarding Coal Production*

OUR national existence and that of our allies in arms and ambitions depend upon coal. The flow of raw materials to industrial centers, to the seaboard and thence abroad; our electric and gas utilities; our railroads; and the dispatch with which we prosecute the war all depend upon a continual supply of ample coal. Coal is inseparable from success in our industrial and national undertakings; it is all-important for health and comfort. Yet notwithstanding these things continuity of our coal supply is in frequent state of uncertainty because miners strike for a higher wage.

The demand of the miners may be just, but their method of enforcing it is criminal at this time. The miners could gain their end without extreme and unjustifiable measures. The prime of our manhood is being conscripted for service in the National Army, to fight for national honor, to make good our word to make democracy safe. Meanwhile the miners go on strike and by reducing coal production place their personal gain above the lives of our country's manhood and our noble cause. Sacrifice of the individual for the common good is fundamental during normal times. It is basic during war. What right have the few to make the many suffer by placing their personal profit at higher value than the nation's cause?

Many of the miners in the Illinois and other coal fields are not Americans by birth, by naturalization nor leaning. They are aliens, and many of them enemy aliens at that. Strikes that tie up shipments, lessen production, create shortages and increase the cost of living may be caused by the determination to obtain a higher wage. But they may also be the result of propaganda that aims to interfere with the prosecution of the war, and thereby endanger this country and its allies.

National needs come before personal requirements. The needs of the masses must be placed above those of the few. The enemy must not be given comfort by his own subjects here, whether intentionally or otherwise. Enemy aliens and others attempting to further their own interests or those of foreign governments cannot longer be permitted to dictate their will to this country, modify its actions or endanger its promises. This country has too long been a harbor to the thankless, and haven to the propagandists, and traitors that would betray it to its enemies.

# Week's Events

## *Report of American Institute Meeting—Doherty Companies Reduce Sign Rates —Automobile Lighting Discussed in Chicago—Activities of Committee on Gas and Electric Service*

### SOME QUESTIONED POINTS ABOUT MAGNETIZATION PHENOMENA.

**Two Papers of Academic Value Give Rise to Discussion at Monthly Meeting of American Institute of Electrical Engineers.**

Two papers upon different subjects, but bearing upon phenomena more or less correlated were presented at the 335th meeting of the American Institute of Electrical Engineers held at New York on December 14. These papers were: "Phenomena Accompanying Transmission with Some Types of Star Transformer Connections—II," by Lloyd N. Robinson, and "Magnetic Flux Distribution in Annular Steel Laminae," by A. E. Kennelly and P. L. Alger. There were fifty-odd members present. In the absence of President Rice, B. A. Behrend presided, and drawing upon his reservoir of "dry" humor, if such may be said to come from a reservoir, he livened up what otherwise might have proven to be a somewhat monotonously technical evening.

Mr. Robinson was not present to read his paper, and F. W. Peek, Jr., placed it before the meeting by pointing out briefly the outstanding points which it was the intention of the author to emphasize. It ran into the much-discussed subject of triple harmonics, pointing out that these components in the exciting current of a transformer are not due to hysteresis alone or to the variation of permeability, but are produced by a combination of the two.

The author mentioned some tests made about two years ago of a star-connected transformer bank supplying a three-phase transmission line, which developed unstable conditions and peculiar phenomena which had not been observed in any previous tests or operation of such banks so far as general opinion and a survey of the literature on transformers disclosed.

The points brought out were the easily demonstratable possibility of a permanently reversed leg of an energized three-phase star-connected bank and also the phenomena of the pulsating neutral. These were substantiated by mathematical demonstration and by oscillograph records.

The paper was a rather deep one, full of cryptic mysticism, as Mr. Behrend expressed it, and a number of the older heads present were frank enough to say they did not understand it.

The Kennelly-Alger paper was abstracted briefly by Lieutenant Alger. He and Dr. Kennelly had started out to investigate an entirely different matter, but certain observed phenomena in the course of their experiments were repeated with such startling distinctness that they turned aside to run them down. The opening paragraph of the paper, here quoted, gives the kernel of their investigation, the balance of the paper being devoted to methods and the actual results of the tests.

"It is well known that when a circular steel lamina, of simple geometrical form, is subjected to a circumferential alternating magnetomotive force, by the application of a ring winding, the magnetic flux density in the lamina is not constant over the cross section, but varies with the distance from the midplane. The flux density is greatest at the surfaces and is a minimum at the midplane, owing to what is commonly called 'skin effect,' or magnetic screening due to superficial eddy currents. This variation of flux density may be called 'depth variation.' The experiments here reported were undertaken to ascertain whether the flux density in the plane of the lamina likewise varied. If 'edge effect' were present, the flux density would be greatest at the inner and outer edges, and would reach a minimum at the mid radius. Such variations of flux density may be called 'radial variations.' The experiments have shown that there is a very marked radial variation of flux density in such laminae, and also a very marked difference in the wave form of alternating magnetic flux density at different radial belts; but these variations are to be attributed, for the most part, to variations in the permeability $\mu$ of the metal under the different values of $H$ at the different radii, the 'edge effect' or lateral magnetic screening being small in comparison therewith."

Among those who discussed the two papers were: A. E. Kennelly, L. W. Chubb, V. M. Montsinger, John B. Taylor, D. C. Jackson, C. O. Mailloux and A. M. Dudley.

There was a little feeling expressed that perhaps these papers, although interesting and of value as scientific investigation, contributing their measure to the advancement of the art, were placing too much emphasis upon certain things which might be considered negligible in practice.

For instance, Mr. Taylor said that he could not see the possibility of even harmonics in the combination described in the Robinson paper unless these were a spark gap, like a broken-down condenser or direct current flowing in the transformer. The Y-Y-connection described should be cheaper and more efficient and there certainly is a place for it in commercial practice. The danger pointed out he thought to be magnified. We often make too much fuss about increased line-to-neutral voltage. The neutral-to-ground voltage, which expresses the transformer's ability, is not pushed up by these phenomena. He, therefore, advocates the Y-Y-connection.

A little of the same feeling was expressed by Professor Jackson, whose appearance was greeted with cheers. He said that in the early days they did not look for any harmonics, much less the third one. They did not know much about them and cared less. They were interested only in fluxes, etc., in general—the fundamentals. Now, the young fellows, who seem to imbibe the fundamentals with their mothers' milk, are apparently chasing the harmonics. In general, he

said the magnetic flux might be most anything the core itself decides to impose upon it. These higher harmonics may be considered like even harmonics as something which may be often present, like our poor friends, and something for which it is hardly necessary to look.

Mr. Dudley also made the remark that there is often a 50 per cent variation in the iron losses in two machines built to the same specifications and from the same lot of iron. Therefore it is not very safe to make broad general predictions as to what will be a general rule or law as regards the magnetic action of these machines.

## RATES CUT TO MEET GOVERNMENT SIGN REGULATIONS.

**Doherty Managers Instructed to Adjust Flat Schedules to Allow for Restricted Lighting Under Fuel Board's Ruling.**

A committee consisting of Holton H. Scott, in general charge of operations; Milan R. Bump, chief engineer; George Williams, manager of the new-business department, and Glen R. Trumbull, assistant manager of H. L. Doherty & Company, has just issued instructions to Doherty central stations generating their current by coal, relative to reducing flat rates so as to meet the requirements regarding sign lighting issued last month by the Federal Fuel Administration.

All Doherty electric properties have been notified by the committee to obey absolutely the rulings of the Fuel Administration, and since the order went into effect, all sign lighting in Doherty cities where coal is used for fuel has been curtailed. This curtailment has meant giving less service to the flat-rate customers, and to obviate that injustice, the flat rates have been adjusted. Following are the reduction on rates affected by the government order, as authorized by the committee in charge:

(1) All roof signs, billboard lighting, outlining, and flood lighting used for advertising will operate at a reduction of 30 per cent on the present flat rate, providing the present flat rate stipulated service from dusk to midnight.

(2) A reduction of 20 per cent of the present flat rate for dusk to midnight service will be made on all directional signs on store and building fronts where store or business is open not later than 6 p. m. and the signs are turned on at dusk and off at closing time, and then turned on again by patrol service at 7:45 p. m. and off at 11 p. m. Where the business is open from dusk until 11 o'clock and the illumination is turned on at dusk and burns continuously until 11 o'clock, there will be no reduction from the present rate. In making this latter stand, the committee in its instructions says: "Our maintenance costs are so increased by this order that such customers can have no just objection."

(3) Company office signs and outline displays on Doherty company buildings are to be lit from 7:45 p. m. until 11 p. m. The committee has instructed the properties to illuminate slogan signs for the same length of time and has added that it is anxious that slogan signs be maintained.

(4) Where customers have signs and windows on the same flat-rate switch, another switch is of course necessary to separate the sign and the midnight window service. The cost of separating this service may be borne by the company if its cost does not exceed $15.

(5) Each company has been instructed to notify all customers with signs and outlines on meter service, of the Fuel Administration's order so that they comply with the regulations.

(6) Companies that have flat rates for less than dusk to midnight service are authorized by the committee to make proportional reductions in rates.

The foregoing reductions were ordered before the new and more drastic order of December 14 was issued, and consequently will doubtless be further revised to provide for the two "lightless" nights a week.

## FEATURES OF THE AUTOMOBILE-HEADLIGHT PROBLEM.

**Paper by Professor Ford and Discussion by Chicago Illuminating Engineers.**

Some unrecognized features of the automobile-headlight problem were presented before the Chicago Section of the Illuminating Engineering Society, at its meeting on December 13, by Prof. A. H. Ford, of the State University of Iowa. In a paper entitled "The Automobile Headlight," he traced the development of the oil, acetylene and electric headlights, pointing out the superiority of the latter in steadiness and convenience, which accounts for its now practically universal use. The results were given of a series of analytical studies, measurements and tests of the effect of change of shape, size and position of the filament in electric headlights. The opinion has commonly been expressed that a true parabolic reflector with practically a point source at the focus is necessary for best results. Prof. Ford showed the effect of departures from the point source and of change of position away from the focus. He felt that a duplex helical filament with one helix lying in the focal axis and inside another helix would give nearly an ideal form; such a filament would not require so sensitive an adjustment as is now necessary to get the best light distribution—a difficulty which accounts for the very many improperly focused lamps one meets so commonly. Manufacturing difficulties, however, may make such a filament not commercially practical. By careful selection of a satisfactory filament form and standardization of lamp parts it is possible to obtain a close approximation to the requisite light distribution without resorting to such expensive and complex glass fronts as are now being exploited so extensively. Prof. Ford said he was surprised to find several headlamps in which the position of the filament was clearly against scientific principles.

The subject was further discussed by Chairman E. H. Freeman, F. A. Vaughn, O. L. Johnson, F. A. Rogers, F. F. Fowle, F. H. Bernhard and Prof. Ford.

**Milwaukee Jovian League Co-Operating With Manufacturers.**—Louis Reinhart was the principal speaker at a meeting of the Milwaukee Jovian League, Milwaukee, Wis., held November 22, which was known as "Mechanical Appliance Company Day." Mr. Reinhart, who is connected with the Mechanical Appliance Company, talked on "Electric Motors," and his interesting talk showed him to be thoroughly familiar with the subject. The Milwaukee Jovian League has designated meetings as company days and November 8 was Cutler-Hammer Manufacturing Day, with George J. Kirchgasser speaking on "Electro Magnets." December 6 was Home Wiring Company Day, in charge of H. E. Brauns, and December 20, Universal Indicator Company Day, in charge of A. C. Bocher.

## ACTIVITIES OF NATIONAL COMMITTEE ON GAS AND ELECTRIC SERVICE.

### Full Co-operation With Government on Sign Lighting, Power Shortage, Priority and Other Important Matters.

Electrical men in general will be interested in a brief outline of the important activities of the National Committee on Gas and Electric Service, since its meeting in Washington on November 1, although some of the important matters taken up cannot be made the subject of publicity.

At that meeting Dr. H. A. Garfield, fuel administrator, attended the meeting and made a few remarks referring particularly to electric sign lighting and the probabilities (at that time) of a considerable curtailment in advertising and display lighting made necessary to conserve a certain amount of coal used for this purpose. Dr. Garfield asked the committee to procure as accurate an estimate as possible showing the amount of coal consumed annually for electric sign and display lighting. These figures were later presented to Dr. Garfield and showed an estimated amount of coal consumed for this purpose by electric light and power companies throughout the country of about 250,000 tons. This has since proved to be a rather high estimate.

Dr. Garfield also had a few words to say as to placing in groups certain industries for priority of shipment of coal. The committee suggested to him that the public utilities should not occupy a position lower than the third group, it being felt that railroad coal and government army and navy transport and bunker coal should have preference as Groups No. 1 and No. 2; then the public utilities, followed by domestic consumers munition plants, coke ovens, steel plants, etc. Dr. Garfield has since that time written a letter to all the coal producers in the country requesting that for 30 days, beginning with December 3, they are to make preferential shipments of coal as follows: First—railroad fuel; second—government navy and army fuel; third—domestic consumers; fourth—public utilities. These to be followed by steel plants, coke ovens, munition plants, and those making government supplies in order that they prove to the authorities that the larger percentage of their output is for government and not commercial business.

Since this meeting the sign-lighting order has been issued and also greatly extended. The committee is co-operating with and assisting the Fuel Administration to the full extent of its ability. It volunteered to place in the Fuel Administration Bureau a representative to whom all complaints from public utilities could be referred for verification and investigation and the granting of such relief as the situation warranted. This arrangement has been very satisfactory.

#### Power Situation in Pittsburgh.

It is very much to be regretted that in certain communities the electric light and power companies have come in for condemnation through their inability to furnish the power necessary and contracted for by various industries in their respective communities. A most serious situation existed and still exists in Pittsburgh—both the West Penn Power Company and the Duquesne Lighting Company being heavily oversold. In the case of the West Penn Power Company this has been further complicated by a breakdown in its apparatus, causing a still smaller output of electrical energy to take care of the demand. Moreover, a very heavy load carried by the West Penn Power Company went to coal-mining operations in their vicinity. These operators have been urged by the Fuel Administration to increase their output, and it is unfortunate that they have been able to give as their reason for diminished production the fact that the electric power companies could not furnish to them the amount of power which they had contracted for and which was necessary to maintain their operations.

The committee was called upon to make an investigation of this situation in Pittsburgh, and the services of R. H. Tillman were offered by the Consolidated Gas, Electric Light & Power Company of Baltimore and of M. S. Sloan's services by the New York Edison Company. After a careful survey at Pittsburgh these gentlemen rendered a report to the Priorities Committee, which covered the situation fully. This committee is at the present time working out with the two companies a priority of service and the denial of service to non-essential industries.

A somewhat similar situation occurred at Mattoon, Ill., due to a breakdown in the plant of the Central Illinois Public Service Company. Many mining operations which were being served by it had their power temporarily suspended. The service has since been resumed and is going on without any interruption. The committee also assigned investigators to make a report on conditions at Alliance and Canton, Ohio, at both of which places there was considerable complaint regarding an insufficient supply of electric power. In each of these communities the situation is very much improved

#### Priority for New Power-Plant Construction Needs.

Innumerable applications for priority on the delivery of electrical material and apparatus for various electric light and power companies continue to pour in both to the National Committee on Gas and Electric Service and direct to the Priorities Committee. The strain is getting very severe on the electrical manufacturers of the country and the Priorities Committee is asking that a thorough investigation be made as to the absolute necessity of installing new apparatus and whether or not it can possibly be avoided. In many cases a survey has to be made to learn if certain non-essential industries cannot be denied electrical service in order to take care of those making war essentials.

Thus the committee was recently called upon to make a thorough investigation and report on the situation at Kansas City, Mo. Application had been received for priority for a considerable amount of material, both building and machinery equipment, for a new plant for the Kansas City Light & Power Company. The committee assigned an expert to make the investigation and from the report which has just been received it is evident that the present facilities are entirely inadequate and that the only solution would be the building, equipping and installing of this new plant. The project has been fully and successfully financed and the report has been turned over complete to the Priorities Committee for such action as it may desire to make.

#### Miscellaneous Activities of the Committee.

The committee has been requested by the War Industries Board of the Council of National Defense to obtain information as to the possibility of there being surplus electrical energy in a number of hydro-electric systems throughout the country. This information is being compiled with a view to establishing

the manufacture of war material in the communities where such power may be available. As a result of this inquiry, a great deal of information has been received which has been turned over to the War Industries Board. It is also anxious to have information regarding the surplus supply of electrical energy from steam generation. It has been found that in some of the larger cities there is a considerable amount available.

The committee formed by experts of the Illuminating Engineering Society has completed very carefully prepared reports containing suggestions and estimates for the lighting of the aviation camps, the lighting of balloon sheds, and lighting systems for outdoor flying. These have been very thankfully received by the Aviation Department of the Signal Corps and are awaiting action.

The War Department has expressed its appreciation of the committee's services in obtaining expert electrical engineers to make investigations and report on the dependability of electric service in the various cantonments. This was caused by certain alarming reports that the electrical service could not be depended upon and that a calamity would result in case of breakdown.

The War Department has recently called on the committee to procure information as to the availability of sufficient electric power for the various hospitals and hospital annexes that are being constructed throughout the country, both isolated and connected with cantonments. This information has been procured and turned over to the War Department.

One of the most recent co-operative efforts on the part of the committee was in offering its assistance to the Treasury Department of the United States for the sale and exploitation of the War Saving Certificates and Thrift Stamps. This committee placed a representative at the disposal of Frank A. Vanderlip in his promotion efforts to introduce these certificates. Plans have been worked out for the sale throughout the United States by the various utilities affiliated with the committee.

## Electrical Companies Actively Promoting Sale of War Savings Stamps.

The United States Government War Savings Stamps now on sale at $4.12 each are being actively pushed by many electrical manufacturers, central stations and electric railways as an unusually favorable savings investment for their employees. These stamps bear interest at 4 per cent, compounded quarterly, so that with accrued interest their total will be $5 on date of maturity five years hence. They afford a splendid opportunity for the employees of moderate salaries to exercise thrift, and loan their modest savings to the Government as they accumulate in lots of a little over $4 each. For each 20 of these stamps affixed to a card the Government issues a $100 savings certificate to be redeemed on January 1, 1923. For those who wish to save in still smaller amounts there are available special Thrift Stamps at 25 cents each, 16 of which are exchangeable for a War Savings Stamp on payment of a premium of 12 cents, until February 1 next, and 1 cent additional for each month in 1918. The stamps have what might be called cash-surrender values to enable recovery of the loan in an emergency.

Both kinds of stamps are on sale at all post offices, by nearly all banks and investment companies, and now also largely by electric and other utility companies. Numerous central stations, at the suggestion of John W. Lieb, president of the National Electric Light Association and chairman of the National Committee on Gas and Electric Service, have undertaken not only to promote the purchase of these stamps by employees, but also by customers and the public in general through the cashiers of their respective offices.

An instance of what is being done in this line is the offer just made by the Commonwealth Edison Company in Chicago. It has been the company's custom to give to practically every employee at Christmas either a turkey or special Christmas gift basket. This year the employees can have the choice of either the turkey, Christmas basket or a War Savings Stamp.

## "LIGHTLESS" NIGHTS DECREED TWICE A WEEK.

### All But the Most Indispensable Lighting to Be Eliminated on Sunday and Thursday Nights.

To the restriction on outdoor display lighting in effect in the last few weeks there has been added a much more far-reaching restriction on both outdoor and indoor lighting by the order issued on December 14 by Fuel Administrator Garfield. In substance, the new order requires that on Sunday and Thursday nights of each week there shall not be in use any more electric lighting than is needed for safety or the conduct of necessary business. The order specifically prohibits on these nights the lighting of advertisements, notices or announcements, or signs designating the place or nature of any business, electric searchlights or other external or ornamental illumination of any building, excessive street lighting intended for display or advertising purposes (commonly termed "White Way" lighting) whether maintained by the municipality or others; moreover, the order also prohibits lights in the interiors of stores, offices or other places of business, when such stores, etc., are not open for business, excepting such lights as are necessary for the public safety, or as are required by law. From this brief summary it is evident that the new order is very much broader and more drastic than the recent one restricting purely display lighting to the hours from 7:45 to 11:00 p. m. each night.

Dr. Garfield is quoted as saying that these "lightless" nights, in addition to saving a large quantity of coal, will provide startling visual evidence that the United States is engaged in the conduct of the greatest of world wars. It is anticipated that the saving in coal will be manifold times as great as that brought about by the order of November 9. In effect the earlier order produced but little diminution of outdoor display lighting as it did not affect the thousands of small signs and cluster or other ornamental posts; the fuel saving was acknowledged to be relatively small.

The new order was but partly enforced on the night of Sunday, December 16, and it is believed that its full effect in rendering the streets gloomy on two nights a week will not be evident until after the holidays on account of the large number of stores that will remain open evenings for Christmas shoppers and because of the occurrence of full moon next week. By the first Thursday of the new year the contrast from their customary brilliancy of the many well-lighted American streets will be very striking, it is believed. The Fuel Administration is advocating that the reduction of all lighting be carried even to the homes to as great an extent as possible on the two nights in question.

## CHICAGO ELECTRIC CLUB—JOVIAN LEAGUE HOLDS PATRIOTIC MEETING.

**Army Food Served at Luncheon—Officers for 1918 Elected.**

One of the most successful noonday meetings in the history of the Electric Club-Jovian League of Chicago, was held on Thursday, December 13, at which over 350 members partook of an army luncheon prepared in exact accordance with government specifications as to menu and quantities. A realistic touch was added by serving the food in army mess kits and replacing the conventional table by bare wooden boards. Sergt. William Geuder, a member of the Club, superintended the service and arranged for the loan of the equipment from Camp Grant, where he is stationed.

Added interest in the meeting was the election of officers for 1918 there being two tickets in the field, each of which conducted a strenuous campaign. The "regular ticket" was successful, the newly elected officers being Fred M. Rosseland, president; Eugene A. Rummler, first vice-president; H. A. Porter, second vice-president; W. H. Hodge, secretary-treasurer, and Paul W. Koch and A. L. Nelson for members of the Board of Managers.

Joseph Beifeld, Frederic Vose, George D. Smith, Homer E. Niesz and others were called upon for brief remarks appropriate to the occasion. Sergt. Geuder presented the principal address describing the complexities of the problems of feeding the soldiers.

A handsome silk service flag bearing eleven stars, made by Mrs. L. C. Spake, was presented to the club, the speech of acceptance being delivered by Mr. Vose.

## SUCCESSFUL REJUVENATION HELD AT MILWAUKEE.

**Local League Initiates 42 Candidates—Interesting Program of Speakers at Banquet.**

At a rejuvenation and banquet held by the Milwaukee Jovian League on the evening of December 14, 42 candidates were initiated.

W. R. Patton, of the Globe Electric Company, was chairman of the Rejuvenated Committee and C. J. Klein, of the Cutler-Hammer Manufacturing Company, chairman of the Entertainment Committee.

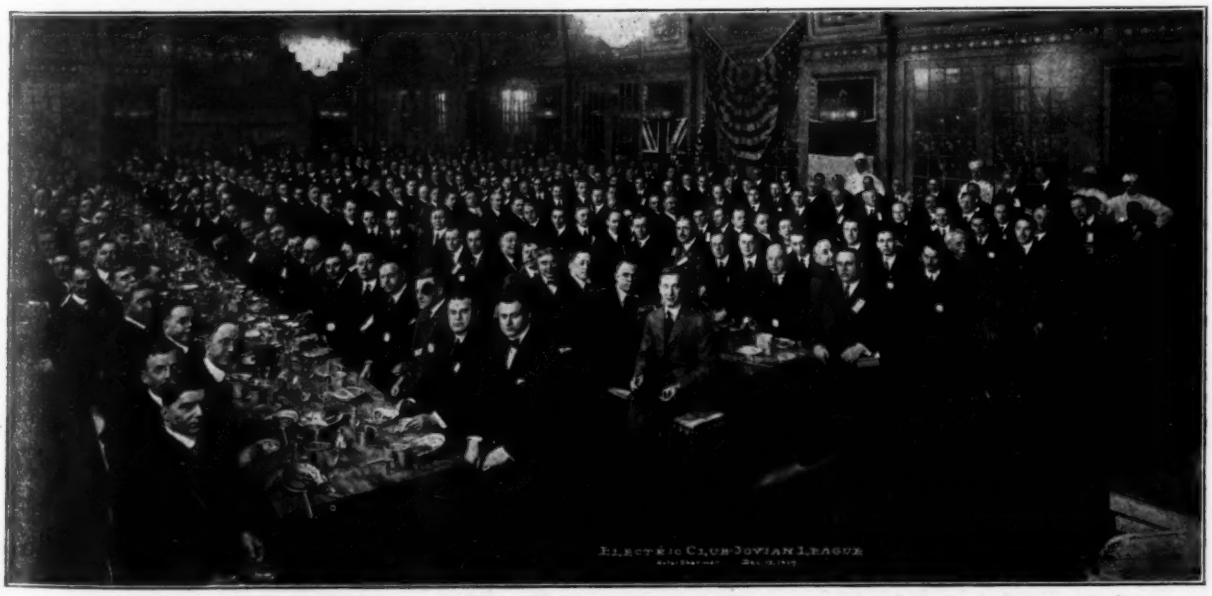
Lieut. William Masson, of the Canadian Royal Field Artillery, was the bright particular star at the banquet. In honor of the seven members who are now with the colors, there was a military program for the after dinner oratory.

Lieut. Masson, connected with the British recruiting force in this country, described life in the trenches, from which he has just returned. After his speech he was kept on his feet for three-quarters of an hour answering questions besides which the questionnaire now being sent out to Uncle Sam's selectmen is a child's primer. He went over as a private and won his commission in the artillery.

Other speakers were S. B. Way of the Milwaukee Electric Railway & Light Company and Capt. H. W. Meissner of Fort Sheridan, a Milwaukeean. The seven members who are serving in the army are G. F. Kiewert, first lieutenant, Three Hundred and Twenty-ninth battalion; Howard Logan, first lieutenant ordnance reserve corps; B. Berssenbrugge, first lieutenant engineering corps; H. L. Schwind, One Hundred and Twenty-first heavy artillery; H. N. Woods, Tenth regulars; Ervin E. Kiefert, Field hospital corps, and N. W. Tickle, U. S. infantry.

Geo. J. Kirchgasser is president of the Milwaukee Jovian League.

**American Miners Forced to Leave Mexico.**—Owing to the chaotic conditions existing in the mining section of Mexico, especially in the states of Guanajuato, Jalisco, Michoachan and San Luis Potosi, American miners are fleeing from that district to escape Mexican bandits operating there. The large hydroelectric plant of the Guanajuato Power & Light Company at El Duro, Michoachan, has been partly destroyed and is out of commission, and much transmission cable has been carried off, resulting in the shutdown of many mills, smelters, irrigation plants, industrial establishments, etc., which were dependent upon the power plant for service. The company is composed of Americans, with stock owned by men of Colorado Springs, Colo. It will take several months to repair damages sufficiently to resume operations.




**Scene at Meeting of Electric Club-Jovian League of Chicago Where Army Food Was Served in Regulation Army Style.**

## ELECTRICAL AND PUMPING EQUIPMENT BEING INSTALLED AT LIMA.

**Ohio City Making Extensive Improvement and Additions to Municipal Pumping Station—Details of New Equipment.**

The city of Lima, Ohio, is making improvements in its water storage, electric pumping, and filtration plants, amounting to about $580,000. This expenditure is subdivided as follows: Filtration plant, and remodeling building for pumping station, $165,000; new storage reservoir, $260,000; pumps and motors at new reservoir, $9500; new boilers at main pump station, $11,400; three low-service pumps at principal station, $1440; new turbogenerator set, $21,700; turbine-driven pumps, high-pressure, $14,600; concrete chimney over boiler plant, $5700.

The original boiler plant has been supplemented by a new battery of two Stirling boilers, each 236-horsepower, at 180-pounds steam pressure, hand-fired. The low-pressure pumps, for lifting water from the original city reservoir to the filtration plant, at a maximum head of 50 feet, consist of three De Laval centrifugal pumps, each of a daily capacity of 4,000,000 gallons; these are driven by a De Laval steam turbine, through reduction gears. Filtered water, in clear-water basin, is forced through distributing mains by two Holley pumps and one Snow pump, all steam driven, installed several years ago; these are being reinforced by a De Laval steam-turbine-operated centrifugal pump.

At the main pump station is a formerly installed 200-kilovolt-ampere generator, operated by a steam engine; to supplement this, a new unit is being installed, consisting of an Allis-Chalmers 500-kilowatt generator, to be direct-connected to a De Laval steam turbine. The current from these two generators is to be transmitted several miles up the Ottawa River to operate motor-driven pumps at two separate reservoirs.

The nearest one of these is the new Lost Creek reservoir of 800,000,000 gallons capacity, where two Platt Iron Works single-stage, centrifugal pumps, each having a daily capacity of 25,000,000 gallons are being put in position; these pumps are being direct-connected to two General Electric motors, each of 200 horsepower, 2500 volts. The volume of water flowing in the Ottawa River is very low during a part of the year, and the plan is to operate the pumps and fill the reservoir at times when the river is at high stages of water. The reservoir will serve as a settling basin to some degree, and the water will be discharged by gravity through a conduit into the main reservoir where the main pump station and filtration plant are situated.

A short distance up stream from Lost Creek reservoir, is situated the old Lima Lake reservoir of 375,000,000 gallons capacity. The pumping equipment at this place consists of two motor-driven centrifugal pumps, each of 12,500,000 gallons daily capacity, making a lift of 23 feet. This installation, however is not new. This reservoir is likewise filled by pumping during the high-water seasons, and is drained by a separate conduit into the main city reservoir.

The new filtration plant to be completed and put in operation by February 1, has six filters of a total daily capacity of 8,000,000 gallons. All this work is being carried through after the plans, and under the engineering advice of William G. Clark, Toledo, and R. Winthrop Pratt, Cleveland, Ohio.

## NEED FOR WATER-POWER DEVELOPMENT SHOWN.

**Secretary of the Interior Lane Draws Attention to the Need of Immediate Congressional Action on Water Powers.**

Secretary of the Interior Franklin K. Lane, in a brief practical discussion of the war, says in his annual report to Congress, made public last week:

Modern industrialism may be epitomized as power plus iron. We lack neither. It is the unprecedented and the not-to-be-anticipated burden of providing not alone for ourselves, but for nearly all of western Europe and part of Asia and Russia which makes the great demand. For our own needs we have coal and iron and nearly all the rich line of less common minerals in abundance. It sounds most boastful to say that the most paternal of governments, intent upon a dynastic purpose, would hardly have found ways to supply itself more liberally with the fundamentals of the great war industries than has been effected by the quiet searching and working of this free people. And what is true as to minerals is equally true as to the products of the soil. The large liberty of life and the casting of responsibility upon the individual, allowing personal ambition to be a substitute for direct command, and curiosity to be the spur to knowledge—these have put under crop the greater part of the continent and made this the relief depot of starving nations.

Of one thing, however, we may be sure, that a nation intent upon its own self-sufficiency would not be holding under what is tantamount to government withdrawal the two newest sources of power—substitutes for that coal which costs the labor of a million men and is the greatest of all the burdens of our railroads—water power and petroleum. It may be expected surely that Congress in its coming session will release these resources by passing those leasing bills which have so long been pending in both houses of Congress.

## Toledo Ice Plant Effects Economies by Use of Central-Station Power.

Citizens Ice Company, Toledo, Ohio, lately completed a new ice-making plant in which electric motors amounting to about 300 horsepower were installed. The two Arctic ammonia compressors are operated by a General Electric motor of 200 horsepower by belt drive; this gives an ice-making capacity of 70 tons per 24 hours. The auxiliary equipment, comprising two air compressors, rotary tower pump, two brine agitating propellers, a crane hoist and elevator are all new machines, operated by motor drive. The consumption of electric power, supplied from Toledo Railways & Light Company's central station, amounts to about 100,000 kilowatt-hours per month. The building of reinforced concrete also houses a cork-insulated ice storage structure of about 4000 tons capacity.

The ice is made from raw water derived from the city's supply of filtered water. This company also operates another ice plant, in which the ice machines are operated by natural-gas driven engines, and in which the auxiliary machines are driven by motors for which current is purchased from the central-station company. J. M. Murphy is general manager of the plant.

# Commercial

## *Philadelphia Company to Supply Shipyard—A Record for Electric Trucks—Sale of Appliances to be Pushed in 1918*

### PHILADELPHIA ELECTRIC POWER SUPPLIED FOR HOG ISLAND SHIPYARD.

**New Service Connections in Philadelphia Temporarily Restricted to Meet Shipbuilding Needs.**

Conservation of electric power to provide energy for the big Hog Island shipyard now under construction close to Philadelphia is included in a government order received by the Philadelphia Electric Company. Under the instructions the commercial department of the company informed prospective customers that pending relief from new power stations no new contracts for increased or new service will be signed. To carry out the shipbuilding program it will be necessary, according to government experts, to use all the electric energy that can be sent from Philadelphia.

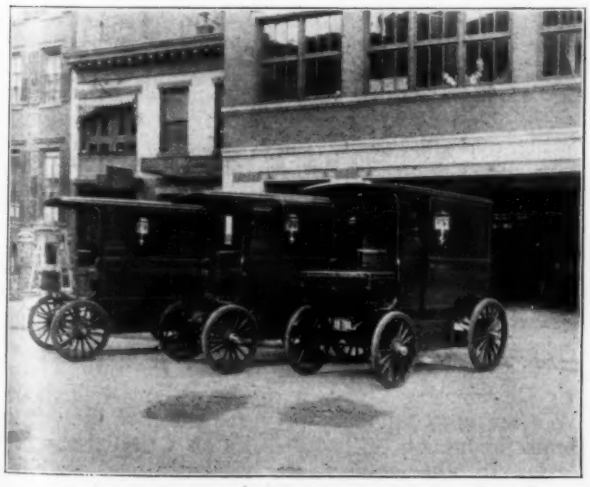
Cables carrying electricity to Hog Island have been in use for some time. W. H. Johnson, vice-president of the company, said a complete interpretation of the order is expected soon.

### EIGHTEEN-YEAR OLD TRUCKS STILL ON DUTY.

**New York Firm Still Using Original Vehicles in Daily Service.**

In constant service for more than 18 years and still going the daily rounds in New York City, giving just as efficient service as when originally installed, a fleet of electric trucks purchased in 1899 offers convincing evidence of the sturdy construction of the early auto trucks.

These cars, five in all, probably the oldest commercial electrics in use today, are the property of a Fifth Avenue firm of silversmiths. The cars were manufactured by the Riker Company.



Electric Trucks Which Have Been in Service for 18 Years.

Impressed by the simplicity of the construction of the delivery car and the durability characterizing its mechanism the Fifth Avenue firm purchased the five as a nucleus for a new and modern electric delivery system.

Other electric conveyances, including one-ton and two-ton trucks, were added to the Fifth Avenue firm's fleet of vehicles a year or so after the delivery cars were installed and they are still in use, always making good under the most trying conditions.

While these are probably the oldest commercial vehicles still in service, there are other fleets of electrics which have been on duty in New York for long periods of time. Ten-year old installations are not uncommon, and electrics with five-year records are too numerous to mention.

### Economic Results of Change From Steam to Electric Power in Ice Plant.

The Northern Refrigerating Company, Toledo, Ohio, which formerly operated with steam power, has recently equipped its plant and installed motor drive throughout, obtaining energy from the power lines of Toledo Railways & Light Company. A new duplex Arctic ammonia compressor, made by Arctic Ice Machine Company, Canton, O., has been put in position. It has 12 by 18-inch cylinders, is a 120-ton machine, measured in tons of refrigeration, and is driven by a 100-horsepower General Electric motor by belt transmission. The pumps, air compressors and other auxiliaries in the plant are operated by motors, aggregating 100 horsepower. Robert C. McKeighan, general manager for the company, estimates that 45,000 to 50,000 kilowatt-hours of electricity per month will be consumed in operating. In speaking of the economy effected by changing from steam to electric power, Mr. McKeighan states that a ton of coal transformed into electric power at the central station will produce 15 tons of ice at his plant; and that while operating the old ice plant by steam power one ton of coal would produce only from four to five tons of ice. Under the new arrangement, based upon the cost of power supplied by the central station, it costs this company 60 cents per ton to produce ice by the special process developed at its plant for producing ice from raw water.

### Electric Heaters Being Tried for Increasing Winter Efficiency of Slate Cutters.

The General Slate Company, Rutland, Vt., is experimenting with electric heaters to warm the workmen operating the slate cutters. If the experiment is successful, it will result in considerable income to the Rutland Railway, Light & Power Company from this class of power. A 300 to 500-watt heating unit is used for each workman. The power plants of the Rutland company are all hydroelectric.

## SALE OF APPLIANCES TO BE PUSHED DURING COMING YEAR.

**Central-Station Companies and Dealers Consider Conditions Peculiarly Favorable—Time Payments May Be Curtailed.**

Conditions resulting from our entrance in the war, particularly with regard to the keener appreciation of economy and efficiency in the home, have emphasized the value of domestic electrical appliances in a striking manner. Electric washing machines, ironers, vacuum cleaners, ranges, etc., have done much to solve the servant problem, lighten the labor in the home and do the work not only in a more efficient manner but at a considerable saving over other methods. Most central stations and dealers appreciate these conditions and realize that now is their golden opportunity to place the domestic electric appliance before the public in its true light as a labor and money-saving necessity.

The question has been raised in some quarters, however, as to the policy for the coming year. It is argued that the propaganda to save coal through the curtailment of the use of electricity will tend to discourage the purchase of appliances. Furthermore it is thought that central-station lines are being so heavily loaded with important power business that no efforts will be made to push the sale of small appliances that mean comparatively little in the way of increased income.

### Why Appliance Load Is Desirable.

It should be remembered, however, that while utility companies will probably have to limit new extensions because of high prices and inability to secure capital on reasonable terms, there is every incentive to increase the load-factor of residence business. This class of business has a notoriously poor load-factor and the diversity-factor is conversely so high that a vast amount of new business could be added without increasing station or transformer capacity.

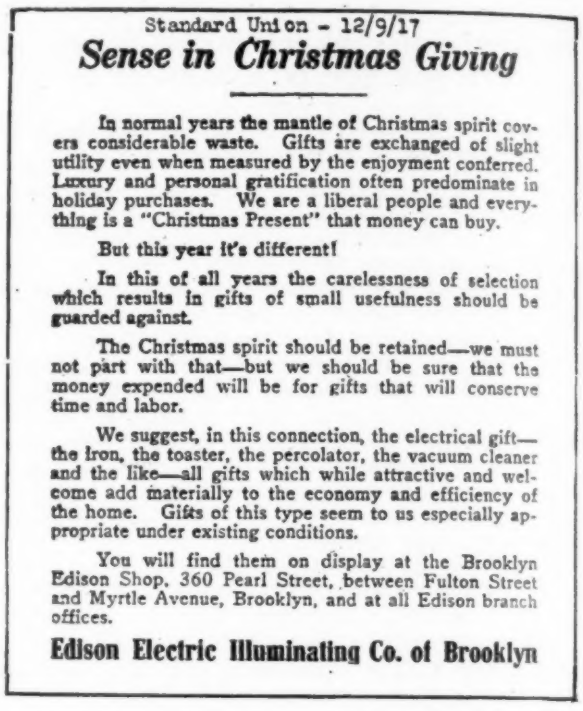
Aside from this phase of the subject, every central-station company is vitally interested in increasing the value of electricity to its residence customers as it is realized that this is the most effective manner of combating municipal-ownership agitations.

### Reports from Sales Managers.

In order to obtain specific expressions from representative central-station companies, the Electrical Review directed an inquiry to a number of well known sales managers of utility companies asking for a statement regarding their appliance and range sales policies for 1918. The replies indicate that, without exception, instead of curtailing activities in this direction, there will be greater activity than ever before. In a number of instances it was reported that because of financial conditions the policy of allowing partial payments over long terms would be temporarily discontinued, but in most of these instances it was felt that this would not retard the sale of appliances as the demand would be greater than in previous years.

### Greater Prosperity Among Customers.

E. A. Edkins, general manager of electrical shops for the Commonwealth Edison Company, Chicago, brought up a very interesting point, which he offers as evidence that there will be increased appliance business during the coming year. He states that the vast sums of money which are being raised by the Government are also being spent by the Government in this country and nearly all of this money is going into the pockets of a large class of people who have heretofore had much less money to spend and who will presumably feel the urge of this new prosperity to spend some of their earnings on household comforts and conveniences. "To this class of people," he said, "such electrical appliances as washing machines, vacuum cleaners, iron toasters, etc., will undoubtedly have a very strong appeal, as indeed they should appeal to all classes who are endeavoring to co-operate with the Government in the conservation of money, labor and material."


Standard Union - 12/9/17

**Sense in Christmas Giving**

In normal years the mantle of Christmas spirit covers considerable waste. Gifts are exchanged of slight utility even when measured by the enjoyment conferred. Luxury and personal gratification often predominate in holiday purchases. We are a liberal people and everything is a "Christmas Present" that money can buy.

But this year it's different!

In this of all years the carelessness of selection which results in gifts of small usefulness should be guarded against.

The Christmas spirit should be retained—we must not part with that—but we should be sure that the money expended will be for gifts that will conserve time and labor.

We suggest, in this connection, the electrical gift—the Iron, the toaster, the percolator, the vacuum cleaner and the like—all gifts which while attractive and welcome add materially to the economy and efficiency of the home. Gifts of this type seem to us especially appropriate under existing conditions.

You will find them on display at the Brooklyn Edison Shop, 360 Pearl Street, between Fulton Street and Myrtle Avenue, Brooklyn, and at all Edison branch offices.

**Edison Electric Illuminating Co. of Brooklyn**

Advertisement of Brooklyn Company Calling Attention to Value of Electrical Appliances.

Quoting further from Mr. Edkins' survey of the situation, "I have met the sales managers of eight or ten of the largest central-station companies in the country and they are all planning to do an increased business in the sale of electrical appliances next year.

"The manufacturers of electrical appliances are all planning for a big volume of business and the output of these manufacturers, as well as those engaged in the manufacture of table and floor portables of every description has broken all records during the year just closing. These companies would hardly be planning for a very large output next year, nor would the newly organized Edison Electrical Appliance Company be preparing to enter the field at this time, unless there was every reason to anticipate a constant increase in the demand for labor-saving electrical appliances for the home."

T. I. Jones, general sales agent of the Edison Electric Illuminating Company, of Brooklyn, N. Y., says: "We are not contemplating a reduction in the sale of domestic appliances, except sales on a partial-payment basis. In other respects our appliance sales are being continued as in the past, all being made on the definite merchandising basis at a reasonable profit." Mr. Jones further reports that business during 1917 has been the biggest in the history of the company and he states that the best answer to the question of appliance sales for 1918 is contained in the accompanying advertise-

ment, published by the Brooklyn company, pointing out the advantages of electrical appliances and their appropriateness as Christmas gifts.

Adam Gschwindt, general manager of the Rockford (Ill.) Electric Company, in outlining the policy of his company, in regard to appliance sales, says: "This company is making a change in its policy in this respect, and that is to encourage the local dealers to handle the sale of appliances, rather than do it ourselves, but insofar as restricting or in any way letting up on the campaign for the use of appliances, this is entirely erroneous. It is the policy of this company to encourage local dealers in the sale of appliances, motors, ranges and electrical accessories as much as possible and we shall continue to do so for 1918."

Many other replies of a similar nature indicate that 1918 promises to be the banner year in the sale of domestic electrical appliances.

### How Many Electrical Appliances Have Been Sold to Date?

An effort has been made by the Society for Electrical Development to ascertain the number of electrical appliances that have been sold. Although it would be manifestly impossible to get complete statistics from the whole industry, the Society has received authentic reports from 100 of the leading manufacturers. The following table may be said to be the first authentic one of its kind to be published.

| | | |
|---|---|---|
| 5 firms sold | 782 | dish washers |
| 6 firms sold | 122,499 | grills |
| 9 firms sold | 69,320 | heating pads |
| 4 firms sold | 6,478 | tea pots |
| 10 firms sold | 82,127 | heaters |
| 5 firms sold | 5,404 | radiators |
| 24 firms sold | 3,202,339 | irons |
| 1 firm sold | 28,000 | ironing machines |
| 40 firms sold | 241,667 | washing machines |
| 31 firms sold | 673,103 | vacuum cleaners |
| 12 firms sold | 1,880,114 | fans |
| 7 firms sold | 114,390 | percolators |
| 7 firms sold | 30,280 | chafing dishes |
| 11 firms sold | 239,668 | disk stoves |
| 11 firms sold | 16,040 | ranges |
| 1 firm sold | 22,000 | vibrators |
| 4 firms sold | 27,676 | water heaters |
| 2 firms sold | 1,300 | griddles |
| 2 firms sold | 535 | miscellaneous |
| 100 firms sold | 7,194,792 | Total. |

### Over 4000 Communities Have Cooking Rate of Five Cents or Less.

Over 4000 communities quote special rates for electric range cooking of 5 cents or less per kilowatt-hour. Of these 1638 are east of the Mississippi River and 1506 west of the Mississippi River. This serves to counteract a general impression that low rates for electric cooking are largely confined to the far western states, where hydroelectric development makes possible low rates.

Electric ranges are rapidly coming into use, 100 of the central stations having over 14,000 on their lines.

## PATRIOTIC ACTIVITIES OF MERCHANTS HEAT & LIGHT COMPANY WIN PRAISE.

### Editorial in Labor Publication Significant Tribute to Indianapolis Company.

Under the appropriate caption of "Putting the Punch in Patriotism," *Union*, a weekly labor newsparer of Indianapolis, Ind., publishes an interesting editorial complimentinlg very highly the patriotic activities of the Merchants Heat & Light Company. Significant excerpts are as follows:

Thinking men long ago came to know that here (Merchants Heat & Light Company) was a modern corporation and operated for profit that had within it elements containing more aspiring motives than the making of profit for the stockholders. And since the war started its whole corporate and individual power has been thrown into the work of stimulating patriotism by practice and precept. It accepted the behest of the President: "Sit tight; don't rock the boat," and it proceeded to carry on business as usual; but it added to its ordinary business the business that must be done if the United States are to realize their motives in entering the war.

No finer example of practical patriotism, made effective through a going organization of men of brains and heart and spirit, could be found than this shown in the work performed by this corporation. And it was quite to be expected that it would be undertaken, for the city has not been indifferent to the practical beneficence of the service it has rendered the people in a purely business way. We are not ordinarily disposed to hand bouquets to public service corporations or their managers—we are rather prone to toss bricks in their direction—but it is certain that if beneficence is to be taken as indicated in reducing the cost of some of the necessaries of life as furnished by the public service corporations, then the use of the term is warranted by the performance of the company. Since it came into the field as a competitor for public patronage it has made it evident that it was competent to furnish the service it offered; it has also demonstrated that it was quite willing and able to make the cost of its service meet the ends of economy.

It reduced the cost to the city of its service to such an extent that the taxpaying body has been saved something in excess of $700,000; it reduced the price of the service it has given private consumers proportionately, and its wholly efficient enterprise has made it possible for the people of this city to save a good many hundreds of thousands of dollars that were previously spent for light and heat.

These things were done without any undue claims of any other than business motives. But the fact that they were done—whatever the motive—shows that the men behind the company accepted and were able to perform the obligations they assumed in taking on the franchise granted them.

The war found the company pretty firmly established in the good will of the people—for it is not difficult for a public service corporation to be popular. And since the war it has grown tremendously in the public esteem. There has not been a day—scarce an hour of the day—when the machinery of the splendid organization that has been built up by H. H. Harrison and his associates has not been carrying on war propaganda or doing more substantial things. It has proclaimed, literally from the housetops, the duty of the citizen; it has led in performing its duties. And it has done much to reconcile the people to the fact that an effective corporate body is not soulless.

This, in common with all corporations, is an aggregation of money and brains. It can accomplish more than the individual because it has greater resources in brains and capital, and it has demonstrated clearly that it conceives the patriotic duty of the corporate individual to be even more imperative than that of the ordinary man.

As an example of that spirit that is bringing the people of this country to a common knowledge of their brotherhood in Americanism, no better example could be cited than the Merchants Heat & Light Company of Indianapolis.

# Operating

## *Need for Fuel Economy Shown—Thawing Out Cables Electrically—Economical Substitute for Matting—January Lighting Schedule*

### NEED FOR FUEL ECONOMY SHOWN.

**Bureau of Mines Reports Higher Ash Content of Coal Makes Conservation in Boiler Room Essential.**

In discussing the general need of fuel conservation in the boiler rooms, Van. H. Manning, director of the Bureau of Mines, Department of the Interior, issued the following statement:

There is one phase of the present coal situation which may put an entirely different light on the supposed increased production of coal of the present year. In round numbers, there was produced 600,000,000 tons of fuel last year. Statement has been made that 50,000,000 more tons will be mined this year. The preparation of this increased quantity of coal has not been as good as in times past. Analyses of samples show in many cases a greatly increased quantity of ash. Repeated cases are brought to the attention of the Bureau of Mines where coal which would run from 6 to 8 percent ash in normal times is running from 12 to 18 percent of ash in these abnormal times. Complaint about the preparation of coal is very general and it is not at all improbable that 5 percent more ash is included in this year's coal than in previous years. If such a figure is true, it means than 32,500,000 tons of the estimated output of 650,000,000 tons is nothing but increased ash. If we can imagine over 600,000 car loads of ash being added to the present burden of transportation, the evident effect on car supply and transportation troubles would be seen. If this were the end of the matter, it would not be so bad. but there is another factor well known to engineers which is apt to be overlooked by the non-technical user. The extensive experiments carried on by the Government at the St. Louis Exposition showed that with the coals used, there was a decrease of about 1.5 percent in efficiency for each 1 percent addition to the ash content of the coal—that is to say, the inclusion of more ash with the coal decreases the value of the fuel not only the amount equal to the useless ash, but it makes the remaining good coal less effective to the extent of 1½ percent for each 1 percent of ash. The inclusion of 5 percent more ash in the fuel, therefore, means a reduction in efficiency of the remaining good coal of about 7.5 percent, which, added to the 5 percent useless ash, makes a total reduction in effectiveness of 12.5 percent.

According to this point of view, although 650,000,000 tons may be produced in 1917, its effectiveness as compared with previous years is probably about seven-eighths of this, and equivalent to a production of normally prepared coal of about 570,000,000 tons. We have then, instead of an increased production as compared with last year, an actual decrease of effective coal of about 30,000,000 tons. If this is added to the estimated increased needs, due to our accelerated activities, of 100,000,000 tons, we have a deficiency of the equivalent of 130,000,000 tons, instead of 50,000,000 tons to make up by good engineering and true fuel conservation in the boiler room.

### THAWING OUT CABLES ELECTRICALLY.

**Practical Suggestions for Overcoming Difficulties Inherent in Cold Weather.**

By M. S. Montgomery.

Dynamic thawing of cables is perhaps the method that assures results in the quickest time and least expense if all goes well, in the same way that electrical thawing of water pipes usually proves most satisfactory. Unfortunately however in using current for thawing underground cables things do not always go right and unless care is taken it is a very simple matter to damage the cable sheath so that a new length of cable must be pulled in after the defective section has been pulled out. In discussing the dynamic thawing of underground cables there are three different cases to be considered, namely that in which the cable frozen up is not carrying current; that in which a cable is or is not carrying current but is inclosed in a section of metallic duct or conduit; and lastly where a cable is inclosed in cement, tile or vitrified clay duct. In the choice of thawing there are two or three methods feasible, in the first instance depending upon whether the cable in inclosed in metallic or non-metallic conduit, whereas in the second case there is the choice of two methods and in the third case only one method of electrical thawing is available.

#### Loading a Cable for Thawing.

In those instances where the temperature is barely at freezing and the cable is frozen up but slightly and the cable has carried no load for some time it may be possible to loosen it up by loading up the conductor inside the sheath to full load or even 50 per cent above for a short period of time. This method is safe, but is very wasteful of time since the paper insulation is a fairly good heat insulator and may even fail to thaw the ice. Should it fail it would be necessary to use the lead sheath or metallic conduit for carrying the thawing-out current.

#### Heating Up the Metallic Conduit.

It is often the practice to run metallic conduit or laterals direct from a service box or manhole to the pole up which the cable goes to the overhead. These laterals, as pointed out in the Electrical Review for November 3, 1917, may be a continual source of trouble during cold weather unless properly drained to prevent the trickling of water into them from the pole and draining into them from the manhole to become trapped and frozen at its lowest level. In cases of this kind it is a common custom to use the metallic conduit or lateral as the circuit for the thawing current. The procedure is exactly the same as that followed in thawing water pipes except that greater care must be exercised in the case of thawing cables. The current should be increased gradually lest the lead sheath be damaged due to excessive current density or because of hot spots, which do not occur so readily

with water pipes since the water or ice conducts it away.

Passing current along a metallic conduit inclosing a lead-covered cable is not free of dangers to the sheath as will be better understood by a review of existing conditions. It can be understood that the cable sheath is at all times in parallel with the metallic conduit between the two points where the thawing current enters and leaves the conduit. Because the current is passed along and picked up from the metallic conduit it does not signify that no current passes along the lead sheath. The question is how much current does actually flow in the lead? How can the sheath be protected against excessive currents? The sheath makes contact with the conduit at numerous places, some are low-resistance some high-resistance contacts. Here and there in the metallic conduit joints occur, some of low and some of high resistance due to paint, rust and poor mechanical connection. The thawing current leaves the conduit and enters the cable at the first contact between the two and may pass back again either way at intermediate points along the sheath until finally where the current flows back to the thawing transformer the current from sheath and conduit meet at the common junction. The total current flowing can be readily measured, but it is a difficult matter to determine at the time, and impossible of determination before, the current that is or will flow along the cable sheath, notwithstanding that the current divides inversely as the respective impedances of the two paths, since the one conductor is enclosed in the other and in mechanical contact with it at numerous points.

It is not a really good contact but a poor one that is to be feared worse because the flow of current causes pitting and even arcing at the poor contact. The problem that the man doing the thawing must decide is whether he shall attempt to keep the lead sheath and conduit separate or shall he allow them to be in contact. Every cable sheath is connected rigidly to the lateral at the cable end-bell, and likewise at several points in the vertical run, in fact it is the pressure of the sheath against the lateral that supports the cable in the vertical position. Moreover most companies bond all sheaths together at each manhole and ground to a ground rod or other good ground. These two earth connections should therefore be left intact and if necessary augmented by additional copper for making good electrical connection between lead sheath and metallic conduit at each end. Doing so will prevent many a damaged sheath due to the passage of current from metallic conduit to lead and vice versa, since this assures equality of potential at the two ends and reduces to a minimum the various potentials at intermediate points due to poor joints in the conduit, etc. The effect of this is to increase the effective cross section to be heated up for thawing, and this in turn necessitates using a higher thawing current.

### Heating Up the Cable Sheath.

Where the cable is inclosed in cement or other form of non-conducting material it is necessary to use the lead sheath of the cable. Occasionally the iron conduit of a metallic duct or lateral rusts and breaks, thereby losing its continuity, and here also it is necessary to use the sheath for carrying the thawing current. It is always a safe procedure to test for continuity with a lamp before attempting to use a metallic conduit as the circuit, for should it be used and be open, that is lack continuity, the lead sheath would in all probability be burnt and the cable weakened if not ruined. Current is fed and collected the same as where the metallic conduit is used, namely between manhole and cable end-bell or between manholes, since these are the only places where the cable is accessible. If the thawing is performed carefully and current increased slowly and cautiously there is seldom any damage done to the lead. If for any reason it is necessary to thaw between two manholes with a third manhole intervening, special care is required. Between two manholes the lead sheath possesses fairly uniform cross-section and all splices are absent since they occur only at manholes. When a manhole intervenes between the two points where the thawing current is applied and connected the current flows through one splice. It is here that great care is needed because although the sleeves of the splice may have ample cross section, and it usually has more than the remainder of the cable, there is always a possibility that where it is soldered to the sheath proper there may be voids which heat up, and lead soon runs when hot. It is best not to include a splice within the thawing circuit therefore unless absolutely necessary. Whereas it is best to bond cable sheath and metallic conduit together while thawing out metallic conduit, it is better to isolate the lead sheath used as the circuit, as it enables lower thawing current to be used.

In making contact with the lead sheath large surface should be employed and comparatively low pressures for the clamps or terminals because lead is very easily damaged, and large surface means low current density. Opinions differ as to what current density is safe or effective. The best policy seems to be to start slowly and cautiously waiting to see what happens as the current is gradually increased. Different makes and sizes of cable have different diameters and thicknesses of lead. It is a good idea to keep a log of the current densities employed for the various sizes of cable so that after a little practice much time is saved and the chief danger is eliminated, namely inexperience.

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### Blasting the Soot Out of a Smokestack.

Sooty smokestacks are wasteful of fuel. A safe and economical way of cleaning them by the use of blasting power is suggested by the Du Pont magazine. For this purpose a "gun" is used, made of an old piece of pipe shafting about 4 inches in diameter and 14 to 16 inches long. A hole 1¾ inches in diameter and 10 inches long is bored in one end of this shafting, converting it into a small cannon-like arrangement, and a touchhole one-fourth inch in diameter is bored through the side about 9 inches from the end, connecting with the center bore and serving for the fuse. This gun is then mounted on a pedestal 6 inches in diameter to hold it upright.

The method of operation is as follows: Pour blasting powder into the mouth of the cannon to about 2 inches from the top. Tamp to the collar with dry clay. A short piece of fuse is inserted in the touchhole and in contact with the main powder charge. Open the flue door at the bottom of the stack, set the cannon on the bottom and in the center of the stack, light the fuse, and close the flue door. The explosion shakes and loosens the soot adhering to the sides, causing it to fall to the bottom. It can then be removed through the flue opening.

A charge of 8 inches of FFF powder, 1¾ inches in diameter, is sufficient for a stack up to 100 feet high and 4 feet in diameter or over. The number of shots necessary to thoroughly clean a stack depends

upon its condition. Ordinarily three or four shots will clean a stack, but if very dirty it may require more. The size of the charge and length of the cannon can be regulated to suit the height and diameter of the stack. There is no doubt about the efficiency of this "gun" for cleaning smokestacks. One of the largest manufacturing concerns in the country has used this method for several years without an accident or injury in any way to the stacks.

## An Economical Substitute for Matting.

By M. S. Montgomery.

The importance of protecting operators and others against shock in the handling and supervision of electrical machinery has for many years resulted in some form of barrier being inserted between the floor and the person standing on it. This barrier originally consisted of wooden platforms and through years of change from one material to another finally settled down to the use of rubber matting or some form of linoleum. There are, however, several very serious objections to the use of rubber or linoleum mats. They invariably curl up and become frayed at the edges after a short time in service unless protected by metallic edges, which tend to defeat the purpose of the insulating mat. They crack and finally break, thus making the degree of protection uncertain. They are frequently the cause of persons falling, especially if in a hurry as when troubles are encountered in a station, or when the place is in darkness or lighting insufficient. Lastly, their first cost is high, very high as compared with their life and degree of protection. In the case of rubber matting it is attacked by oil, which accelerates its deterioration, and at this time is of such high price that it cannot be purchased except when radically adulterated, to the loss of dielectric strength.

With all these disadvantages of the mat used for station switchboards, and around electric apparatus in general, a practice being followed by some of the largest central-station companies, that is at once a safety move and a very economical one might be of interest. Instead of using a mat that can cause trouble and that can be moved from one place to another, these companies are using a substance that is made an integral part of the station floor or wall. This substance is applied to the floors or walls in the same way that cement is applied but with a few additional details. To apply this insulating compound: A waterproof priming is first applied to the floor. The insulating compound is then applied, about six coats being used. Each coating is allowed to dry before the placing of the next, and a sprinkling of powdered lime is applied over each coating as it dries. After the final coat, the number depending upon the electric strength to be withstood, and thickness of barrier desired, the final surface is polished with a mixture of wax and gasoline.

This insulation compound—Mastic Insulite it is called—wears well, it forms a hard surface that will not crack, soften under heat, absorb moisture nor suffer from abrasion nor attrition under the traffic of feet. It has an extremely dielectric strength, that is to say insulating properties, and apparently does not deteriorate in this respect, even if oil and similar substances are allowed to be spilt over it. Stains are easily removed by an application of a little gasoline. Mastic insulite is a dark brown color, that enables it to harmonize with station apparatus, and all kinds of switchboards, whether of slate, of asbestos or of marble. The writer has rolled heavy machinery weighing thousands of pounds over flooring made of this material with no sign of distress. For the purpose for which rubber matting is usually used, namely protection against electrical shock around machinery and switchboards, this insulating compound is far superior, because it is permanent, and of very much lower cost. One gallon of this material covers about 60 feet of floor space, and costs but a fraction of rubber matting.

## Using Exhaust Steam Effectively.

More attention than ever before is being paid this winter to careful use of exhaust steam in power plants. It may be applied to innumerable purposes, such as heating feed water for the steam boiler, for many washing purposes, heating buildings, pasteurizing and sterilizing, and the like. A small investment in additional boiler-room equipment, such as an exhaust-steam heater, will effect savings of several hundred dollars a year in the coal bill of even a moderate-sized power plant.

## Street Lighting Schedules for January.

Exceptional attention is now being given to all kinds of outdoor lighting. This gives added interest to the standard schedules for street lighting. The following is the Electrical Review's table for January on the all-night and moonlight schedules—the two most widely used. Time is given in mean local sun time and the table is compiled for latitude 40° north.

JANUARY, 1918

| Night of Jan. | All-Night Schedule | | Moonlight Schedule | |
|---|---|---|---|---|
| | Light | Extinguish | Light | Extinguish |
| 1 | 5:15 | 6:50 | 5:15 | 10:00 |
| 2 | 5:15 | 6:50 | 5:15 | 11:00 |
| 3 | 5:15 | 6:50 | 5:15 | 11:55 |
| 4 | 5:20 | 6:50 | 5:20 | 12:55 |
| 5 | 5:20 | 6:50 | 5:20 | 1:55 |
| 6 | 5:20 | 6:50 | 5:20 | 2:55 |
| 7 | 5:20 | 6:50 | 5:20 | 4:00 |
| 8 | 5:20 | 6:50 | 5:20 | 5:00 |
| 9 | 5:20 | 6:50 | 5:20 | 6:00 |
| 10 | 5:25 | 6:50 | 5:25 | 6:20 |
| 11 | 5:25 | 6:50 | 5:25 | 6:20 |
| 12 | 5:25 | 6:50 | 5:25 | 6:20 |
| 13 | 5:25 | 6:50 | 5:25 | 6:20 |
| 14 | 5:25 | 6:50 | 5:25 | 6:20 |
| 15 | 5:30 | 6:50 | 7:20 | 6:20 |
| 16 | 5:30 | 6:50 | 8:35 | 6:20 |
| 17 | 5:30 | 6:50 | 9:45 | 6:20 |
| 18 | 5:30 | 6:50 | 11:00 | 6:20 |
| 19 | 5:35 | 6:50 | 12:10 | 6:20 |
| 20 | 5:35 | 6:50 | 1:20 | 6:20 |
| 21 | 5:35 | 6:45 | 2:25 | 6:15 |
| 22 | 5:35 | 6:45 | 3:20 | 6:15 |
| 23 | 5:40 | 6:45 | 4:15 | 6:15 |
| 24 | 5:40 | 6:45 | 5:00 | 6:15 |
| 25 | 5:40 | 6:45 | No light | |
| 26 | 5:40 | 6:45 | No light | |
| 27 | 5:40 | 6:45 | No light | |
| 28 | 5:45 | 6:40 | 5:45 | 7:50 |
| 29 | 5:45 | 6:40 | 5:45 | 8:50 |
| 30 | 5:45 | 6:40 | 5:45 | 9:45 |
| 31 | 5:45 | 6:40 | 5:45 | 10:45 |

The table for the entire year, corrections for standard time and latitude, rules for these two schedules and modifications and combinations of them, as well as monthly and yearly total hours of burning on five schedules, are printed in a booklet obtainable from the Electrical Review for 25 cents a copy.

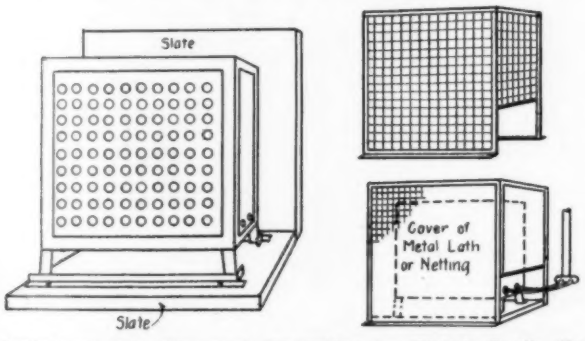
# Construction

## *Projecting-Machine Rheostat as Heater—Useful Hints and Kinks—Toledo Maintenance-Service Expert—Contractors' Doings*

### How Rheostat for Motion-Picture Machine May Serve as Heater in Ticket Booth.

By T. J. Coghlan.

All motion-picture-machine operators know of the heat that is necessarily wasted in a rheostat. Some of the older operators will, no doubt, recall instances where this heat was utilized during the winter months by extending the wiring of the picture-machine circuit and placing the rheostat in the ticket seller's booth. This idea of causing the rheostat to serve the additional purpose of an electric heater has applied mostly to motion-picture houses that previously had been used as stores or places of business. In nearly all amusement houses of this description the ticket seller's booth is located prominently in front of the entrance, and in cold weather is not a very comfortable station for the ticket seller. In this connection it may be of interest to recall here one of the original answers given by an applicant for an operator's license before the New York examiners some years ago. On being asked what was the purpose of using a rheostat in the motion-picture circuit, he replied, "it was for heating the cashier's booth."




**Method of Mounting and Protecting in Ticket Booth the Rheostat for Picture-Projecting Machine.**

The cold weather is here again, and as we are all now striving for greater economy and efficiency in every way possible, the question of using a rheostat for the additional purpose mentioned may be of interest.

Some electricians and operators seem to think that the rheostat must be placed in the operating booth, but there is no rule in the National Electrical Code which states it must be placed there. A rheostat is a heat-creating device, and as such must be installed with ample protection between same and surrounding combustible material. If not possible or convenient to place the rheostat so that it will be at least one foot away from such material, a slab of slate somewhat larger than the rheostat must be interposed. Viewing the device as a heater and figuring what is always of the utmost importance, the lessening of any possible fire hazard, the best location is on the floor, midway between front and back of the ticket booth. In this case, although space may not permit placing the rheostat one foot from side of booth, but two slate slabs will be required, one to serve as a base on which to mount the device, and the other to interpose on the side. The ordinary 110-volt 25-ampere rheostat measures approximately 12 inches long, by 12 inches high, by 4 inches wide. Allowing a margin of 2 inches on all sides, the slab for the base should be 16 inches by 8 inches, and the slab for the side 16 inches by 15 inches. The slate should be one inch in thickness with holes drilled in same so as to securely fasten in place by means of screws.

In the case of the slate slab, however, provision must also be made to hold the rheostat evenly on the slate. A good way to do this is to take two pieces of half-inch angle iron, 14 inches long, and drill two holes in each. After placing rheostat evenly on base, lay each piece of angle iron lengthwise against legs of rheostat. Next carefully mark slate with a pencil or nail through the holes in the angle irons. Using a brace and twist drill of the required size, it is not a difficult matter to drill the holes in the slate. The same drill may be used first to drill the holes in the angle irons. By making a cut with a hacksaw lengthwise for about one inch on end of each iron so that edges may be readily bent on striking with a hammer, any displacement of rheostat when finally set up will be obviated. Although the irons and slate may now be easily secured to floor by wood screws engaging both, it would be more desirable to secure the former independently to the slate by means of bolts and nuts, the heads of which must be countersunk one-eighth of an inch on underside of slate and then covered with a wax sealing compound. The object of this is to prevent any possibility of grounding the frame of the rheostat. The first sketch herewith illustrates the method of mounting the rheostat.

An additional perforated cover is necessary to prevent any inflammable material, as for instance the dress of the ticket seller, from coming in contact with the hot rheostat casing. A good cover may be easily made by using one-half-inch angle iron as a frame with sides cut from metal lath, such as used in fireproof plaster partitions. The sides may be firmly attached by means of bolts and nuts, using narrow sheet-metal strips to provide a facing at the edges for better support under the bolt heads. The dimensions of the cover should allow a space of two inches on all sides of the rheostat, and at the same time the part of the frame resting on the floor must fit snugly over the edges of slate base. In order not to interfere with the leads to the rheostat that side of cover need not extend all the way down to the lower part of frame. See the second sketch.

The details of extending the picture-machine circuit depend, of course, on the location of the operator's and ticket seller's booths, but in picture houses of the type covered by this article the floor of the former and

the top of the latter are usually not far apart. The two leads forming the loop to the rheostat from the operator's booth must be flexible asbestos-insulated wire at least—No. 8 B. & S. gauge. The wire must be run in iron conduits, which should end in each booth in a Condulet fitting with a two-hole porcelain cap through which to bring the leads. The Code requires that wires run in conduit be rubber-insulated, and formal permission should, therefore, be secured for the use of the asbestos-insulated wires instead where there is an inspection department. The desirable feature of such construction is that the asbestos-insulated wires are in continuous lengths between lamp, operating switch and rheostat. Should an inspection department insist on rubber-insulated wire in the conduit, then at least No. 6 B. & S. gauge wire must be used, tapping on asbestos-insulated leads for both lamp and rheostat in boxes which must be provided on each end of conduit for this purpose. The third sketch shows the method of terminating conduit and extending leads.

After the necessary wiring is completed between the two booths, the rheostat may be employed as weather conditions suggest. Two picture machines are employed in most operating booths nowadays. Under such conditions one of the rheostats placed in the ticket booth, and giving service as a heater for alternate 15-minute periods, will likely prove satisfactory. In case there is but one machine, the operator would do well to have another rheostat in reserve, located on the usual shelf either inside or outside the operating booth. Then, in case of mild weather, it would be a simple matter to disconnect the loop to the rheostat in ticket booth and place in circuit the reserve one. In an emergency, of course, there is the door of the ticket booth which may be partly opened. Also a small panel may be cut and hinged in the side of booth near where rheostat is located, by which means the heat may be modified as desired. In any case it is not a difficult matter for an operator who is also a good electrical mechanic to work out different combinations whereby he may put to practical use, at least during the cold weather, the heat that is usually wasted in the rheostat.

## Useful Hints and Kinks in Construction and Maintenance Work.

By Maurice J. Moriarty.

The selective draft is playing havoc with the construction gangs of electrical contractors and the electrical maintenance crews of large industrial works. Any shortcuts or hints that will relieve the work of the men that are left or will make it easier for new and not fully trained men to take up the work should therefore prove of value, and it is with this idea in mind that the following ideas are submitted, even though most of them are not brand new "kinks."

*Making Feed Wires Pull Easy.*—During the summer months and also in the winter on inside work in the neighborhood of steam pipes and the like, feed wires are apt to be soft and gummy from heat. A gummy feed wire is harder to pull into a conduit because the insulation sticks to the interior of the conduit. When I have a case of this kind I rub soapstone onto the feed wires before I start to pull them in. The soapstone enables the wire to slide through without sticking, thereby eliminating the difficulty that gummy insulation would cause.

*Retarding the Setting of Plaster of Paris.*—On old-house work and new building finishing, the electrical worker has a great deal of plaster of paris patching to do at times. To delay the setting of plaster of paris so as to make as many patches with one mixing, drop about one-half teaspoonful of citric acid in a five-pound batch of plaster. This will delay the setting from one to three hours. The juice from a lemon or some vinegar may also be used with good results.

*Carpenter's Scraper Is Useful.*—A very useful tool in the kit of an inside electrical worker is a carpenter's scraper, also called a cabinet scraper. By using the scraper as a chisel with a hammer to drive it, floorboard tongues may be cut without marking the floor top. The ordinary carpenter's chisel marks the floor where it is driven into the space between two boards to cut the tongue. The carpenter's scraper is thin and when used in the same manner does not mark the floor and yet it cuts the tongue very rapidly.

*Taking Off Baseboards.*—When wiring an old house, the wireman frequently has to take off the baseboards in some of the rooms, to wire to outlets located in partitions. Whenever I take off a baseboard I cut off the baseboard nails flush with the back of the board. When the work is installed I nail the baseboard back into place, using a fine finishing nail and keeping the nails concealed as much as possible. This method prevents the splitting and cracking of the baseboard surface from driving the old nails through the board to take them out.

*Rule Support for Accurate Measurements.*—When a wireman has used a flexible folding rule of the zigzag type for rush construction, the rule-joint rivets work loose from constant use. This interferes with the accurate measuring required for locating ceiling outlets, where the rule has to be stretched to its full length. To avoid this difficulty, I tape the six-foot rule to a 10-foot strip of ⅞ by ⅞-inch pine. The rule is taped into position on the strip or stick so that each end of the rule is 24 inches from each end of the strip. I have found this rule kink to be a big time saver on contract work.

*Substitute Finish for Conduit Fittings.*—When a wireman is doing conduit work and is using galvanized fittings, he sometimes breaks a fitting or is short one of a required type. He may order another fitting and forget to specify the galvanized finish and therefore receive a fitting with a bright black finish. I have had that happen occasionally and have saved time by painting the black fitting with aluminum lacquer. The aluminum finish is a good substitute for the galvanized finish as far as appearance is concerned but not for wearing qualities. It is suggested only for emergencies such as mentioned.

*Painting Lead-Covered Electric Wires or Telephone Cables.*—In order to apply a durable paint finish to lead-covered electric power or telephone cables, the first coat should be a thin coat of varnish. By applying this coat of varnish before the paint, the usual chipping and pealing of the paint can be prevented.

*Emergency Fuse Cabinet Should Be Handy.*—An emergency cabinet for keeping a stock of fuses for the lighting and power circuits of factories is a means of preventing needlessly long service interruptions. A glass-faced cabinet should be located in a convenient place. In this cabinet six of each of the fuses required should be on hand at all times. Each size should be kept in a section labeled for that one size. When a fuse for a particular machine or circuit is wanted, it may in this way be secured with a minimum loss of time.

## AN EXPERT IN MAINTENANCE OF ELECTRIC POWER EQUIPMENT.

**Sketch of Frank Duffeck, of the Electric Power Maintenance Company, of Toledo, Ohio.**

Frank Duffeck, owner of the Electric Power Maintenance Company, and active manager of its shops at Toledo, Ohio, started a maintenance service with two men in 1909, and in the few intervening years has developed a business that now requires 35 men, most of whom are especially skilled in electrical work. The shop is equipped for electric welding, armature winding, motor reconstruction, also charging of lighting and starting storage batteries.

A low-voltage test instrument, devised by Mr. Duffeck, has been found of special value in service stations for testing motors to locate their defects. He has several other machines of his own design that are used in his shop in winding and insulating. In this line of shop development the purpose of labor-saving has been uppermost. All features considered, Mr. Duffeck has built up an electrical maintenance business both successful and unique.

His own work began in electrical shops some years ago and he is a graduate from the school of experience and self-help. He foresaw the extensive use of

**Frank Duffeck,**

President of the Electric Power Maintenance Company, Toledo, Ohio, one of the originators of skilled, prompt and dependable motor-maintenance and repair service; inventor of instruments and machinery to facilitate testing and rewinding of motors and generators; owner and active manager of one of the largest and best equipped motor-maintenance shops.

electric motor drive in industrial plants and the growing need of skilled, prompt and dependable maintenance and repair service. Since he opened his shop some eight years ago he has seen a steady increase in the demand for just such a service as he was organized to furnish. Especially in the last two years when the industries of Toledo and Ohio generally made such rapid progress and were nearly swamped with rush orders, the value of reliable and speedy repairs has brought a great deal of work to Mr. Duffeck's firm, all of which has been handled with system and dispatch.

### Among the Contractors.

Marine Electric Company, Louisville, Ky., has established itself in a new location, 323 West Market Street. The retail branch is in charge of E. B. Allen, formerly with the H. C. Tafel Electric Company. E. C. Thirlwell is president, and F. E. Good is secretary of the company, which has made excellent progress since its organization.

Contract for the lighting system for the new Crescent Store at Spokane, Wash., has been awarded to the Doerr-Mitchell Electric Company, at a contract price of about $4000.

Seton Electric & Fixture Company, 17 West Kinney Street, Newark, N. J., has been awarded a contract by the Board of Education of Newark, for the installation of electric fixtures in the public school on Fifteenth Avenue.

Peterson & Carlson Company, Youngstown, Ohio, is wiring several residence buildings for the following owners: Home Building & Finance Company, O. E. Hawk & Company, Frank Porter, N. C. Weber, J. Docomona and others.

C. H. E. Williams, Securities Building, Seattle, Wash., has been awarded a contract for installing electrical equipment including lighting and power in an assembling plant at Victoria, British Columbia, being erected by Grant Smith & Company and McDonnell, limited, for the Imperial Munitions Board.

NePage, McKenny Company, electrical engineering and contracting, Armour Building, Seattle, Wash., and having offices in other large Pacific Coast cities, reports that its Portland branch office has closed contract for complete electrical equipment for the Medical School for the University of Oregon, at approximately $6000.

An electric lighting plant recently was completed at London, Ohio, by the Joseph L. Skeldon Engineering Company, Toledo, in which two 240-kilovolt-ampere generators, direct-connected to two Chuse noncondensing Corliss engines were installed. This is a municipal plant. The Skeldon company also made an important addition to the municipal plant at Barberton, Ohio, comprising one 312-kilovolt-ampere generator, direct-connected to a Chuse uniflow engine, which runs at 185 pounds steam pressure and 200 degrees superheat.

La France Electrical Construction & Supply Company, Toledo, O., has under execution a number of contracts in that city. Some of the more important consist of the lighting and power installation in Mercy Hospital; the lighting and power equipment in the plant of the United Food Products Company, amounting to $30,000 for the installation work; the switchboards, wiring, distributing panels, and motors required in the new plant of the Bunting Brass & Bronze Company; the power and lighting installations in the Citizens' Ice Plant, including two motors for ammonia compressors; also similar work for Maumee Ice Company.

Electric Supply Company, of Salt Lake City, Utah, which started as a small contracting company five years ago at 330 State Street in that city, has now one of the leading wholesale and retail electric and automobile-accessories stores in the Salt Lake district. It has just moved into larger quarters on State Street and Floral Avenue, where it has a floor space of 25,000 feet, including an extra building fronting on Floral Avenue, which is used as a vulcanizing and battery-charging plant. Five commodious rooms are devoted to display of electric lighting fixtures and electrical goods of all kinds are carried in stock. R. O. Carter is manager of the company; Joseph R. Smith, vice-president; H. L. Mulliner, treasurer, and C. J. Elder, secretary.

# BOOK REVIEWS

"Theory and Calculations of Electrical Apparatus." By Charles Proteus Steinmetz. New York: McGraw-Hill Book Company, Inc. Cloth, 502 pages (6x9¼ inches), illustrated with 227 line drawings. Supplied by Electrical Review Publishing Company, Inc., for $5.00.

Devoted to apparatus, rather than phenomena or circuits, this is one of the three volumes which have sprung from the single volume which Dr. Steinmetz presented twenty years ago as his "Theory and Calculation of Alternating-Current Phenomena." Transformers having been included in one of the other divisional volumes, the term apparatus is here used as including only alternating-current motors, generators, rectifiers and rotary converters.

Being intended for advanced students, this book assumes the reader to be familiar with the general arrangement of a considerable part of the apparatus here discussed, and starts right in with a chapter on the "Speed Control of Induction Motors," including a discussion of different starting devices and of different arrangements for speed control. Likewise, the succeeding chapter on "Multiple Squirrel-Cage Induction Motors" assumes the reader's familiarity with single-cage motors of this class and devotes itself to the calculations for the double and triple-cage types. Later chapters on "Induction-Motor Regulation and Stability," on "Concatenation," on "Synchronizing Induction Motors," and on "Phase Conversion" serve as preludes for long chapters dealing with the calculation of apparatus employing corresponding principles.

As in all of Dr. Steinmetz' works, both the mathematics and the logical discussion of the different points are characteristic of his master mind, and the contents of this volume when compared with less than a fourth as much space devoted to such themes in the earlier work, show the remarkable progress of the past twenty years. Turning to its predecessor, one looks in vain for even a casual mention of apparatus to which the new volume devotes a considerable share of its contents, such as concatenated motors, squirrel-cage motors, rectifiers, polyphase induction motors, unipolar machines, phase balancers, permutators, shading coils, starting devices, or the use of condensers for improving the power-factor and for speed control. Over 200 diagrams and other cuts form valuable adjuncts to the descriptive matter, and a cleverly worded glossary near the end of the volume (strangely entitled "Review") briefly summarizes some of the characteristics, and advantages or disadvantages of different types.

These and other new themes bespeak the comprehensiveness of a volume which will probably long be a standard work for college students and for designers of electrical apparatus. Indeed, if this greatly enlarged revision were as readable, as logically arranged, and as well indexed as its predecessor of twenty years ago, it should rank as a masterpiece. In the earlier volume, Dr. Kennelly and Mr. Weaver had co-operated with Dr. Steinmetz in so presenting the subject matter that the meaning could be readily grasped at a glance. In the present edition this collaboration is sadly missed, and in many portions the involved phrasing, the omission of little words which would make smoother phrases, and the unusual punctuation all make the reading difficult, and sometimes even leave the meaning ambiguous. So also, the scantiness of the indexing will interfere with the ready access to the contents. Such defects seem doubly unfortunate in an up-to-date work of a master mind, whose clearness of logic ought to be readily discernible in every line.

ALBERT SCHEIBLE.

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"Direct and Alternating-Current Machines and Systems." By William S. Franklin. New York: The Macmillan Company. Cloth, 465 pages (5⅝x8½ inches), illustrated. Supplied by Electrical Review Publishing Company, Inc., for $4.50.

This new textbook by Professor Franklin is offered as a new Vol. 1 of the series on "The Elements of Electrical Engineering," of which the second volume was issued five years ago as "Electric Lighting and Miscellaneous Applications of Electricity." Knowing that the real value of such a college textbook will depend largely on the extent to which its contents can be correlated with practice by the student after he leaves the college, the author has wisely placed considerable emphasis on the simple physics of the subject and on the operative engineering phases of the same. Indeed, Professor Franklin shows his recognition of practice at the very outset by devoting two introductory pages to the national organizations and societies relating to engineering. Mechanical analogs are used effectively for explaining the action of condensers, dielectrics and transformers, and the arrangement of lightning arresters, but most of the 360 illustrations are diagrammatic. Far more space is devoted to illustratory problems than in the earlier volume of the series, there being 221 in all.

For the student who retains his textbooks for later reference, this volume might be enhanced in value by increasing the number and scope of the footnotes referring to other books and publications in which various topics are treated more fully. However, this shortcoming is gladly overlooked in view of the clarity of treatment of the subject matter, and of the painstaking qualifying of many of the author's statements. So also, the author has shown admirable judgment in the arrangement of the various topics. For example, both the Coolidge tube and the vacuum-tube rectifier are explained in the 18-page chapter on The Electron Theory, which clearly readable chapter marks a welcome innovation for books of this type. This chapter forms part of the first third of the volume, which is devoted to a review of elementary and applied electricity and magnetism. Direct-current machines are then considered, both as generators and as motors and with relation to armature reaction. A third part treats of the elementary theory of alternating currents, and a fourth is devoted to alternating-current machines and systems. To make the work more self-contained, its appendix includes a long section of ordinary differential equations, reprinted from the "Calculus" of Franklin, Mac Nutt and Charles; also chapters on the use of characteristic curves and on armature windings.

While the high classroom value of the work is already guaranteed by Professor Franklin's own use of the same, it also deserves particular consideration because of its extensive recognition of modern practice and because of the clarity which should make it a textbook worth preserving for later reference.

ALBERT SCHEIBLE.

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**Patriotic Electrical Dealers.**—Call & Forsyth, electrical supply dealers of Pineville, Ky., handling also mine and mill supplies, announced that the net proceeds of all sales during Thanksgiving week were donated to the Red Cross.

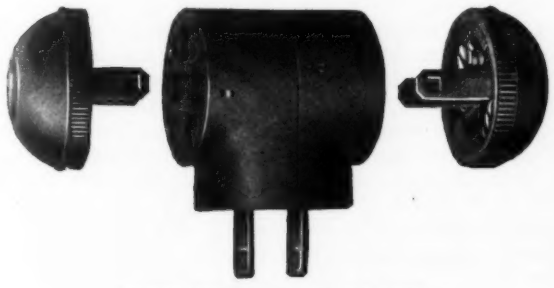
# New Appliances

## *Duplex Outlet Plug—Electric Air Heaters—Charging Sets for Miners' Battery Lamps—Arc-Welding Equipment*

### Spartan Duplex Adapter or Twin-Outlet Plug.

A duplex adapter which transforms a single outlet receptacle into a double-outlet receptacle, from which two portable lamps or devices can be simultaneously fed, has been added by the Bryant Electric Company, Bridgeport, Conn., to its well known Spartan line of interchangeable receptacles and plugs.

The new device, which is known as the "KH Spartan duplex adapter," consists virtually of a double Spartan receptacle and a Spartan plug combined. The plug can be inserted into any of the standard Spartan receptacles and two outlets are then provided at each side of the plug, which will take any Spartan plug cap, either of the parallel or tandem-blade or polarity type. It can also be used in conjunction with the Spartan screw-base adapter to transform an Edison screw-base socket or receptacle to a duplex Spartan. The adapter is National Electrical Code standard.

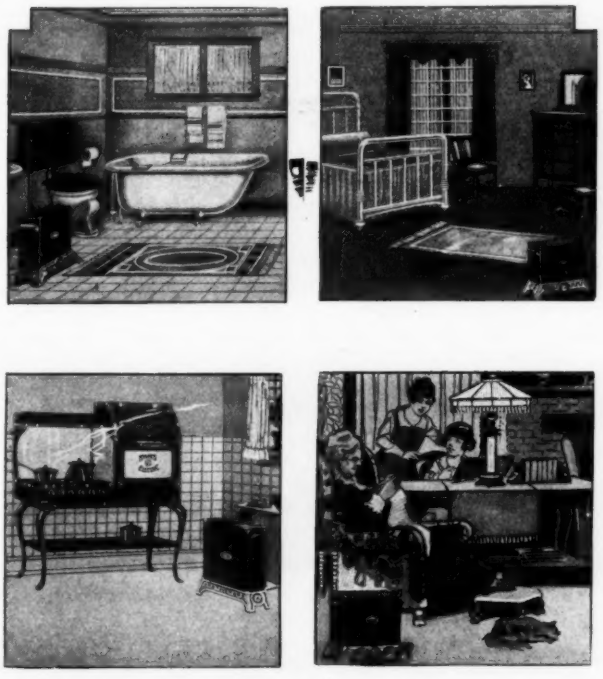


Bryant Spartan Duplex Adapter.

### Hughes Electric Air Heaters.

The problem of coal conservation is one of the most serious confronting the nation at this time. Specific suggestions have been given to householders by which they can reduce the amount of coal used in heating their homes advantageously. For instance, it is recommended that in relatively mild weather the furnace or boiler be not operated at all and some form of self-contained portable heating device be used in those rooms that must be warmed while dressing on chilly mornings. Again it is suggested that certain rooms of the house be not heated, except for the relatively short time during which they are occupied. It is evident from the foregoing that the opportunity for using an electric air heater has greatly been increased. Such a device results in distinct economy by enabling the owner to heat rooms just as occasion requires without depending on the central heating plant. Moreover, such an electric appliance permits reinforcing the heat from the central plant on those very windy and chilly days when insufficient heat is provided.

View of Hughes Air Heater Tipped to Show Accessibility of Heating Element for Connecting to Cord.



Views Showing Typical Uses of Hughes Electric Air Heaters in Bath Room, Bed Room, Kitchen and Living Room.

Recognizing the need for electric room heaters, the Hughes Electric Heating Company, 5660 West Taylor Street, Chicago, has placed on the market a line of heaters, some of the uses of which are illustrated in the accompanying cuts. These also illustrate the general design of the heater, which is further shown in the cut where the heating element can be seen pulled out of the heater casing. This latter illustration also shows how easily the heater can be wired to the connecting cord. The heaters are inclosed in a black-

enameled steel casing, which prevents contact with the glowing heating coils. The base is enameled cast iron and the ornaments are nickel trimmings. The heaters are provided with either single or three-heat switches for controlling the heat. They are made in six sizes, with watt consumption ranging from 1000 to 4000 watts. The smallest size has dimensions of 9 by 15 by 17½ inches and weighs only 12½ pounds. The largest size has dimensions 9 by 22¼ by 23 inches and weighs 25 pounds.

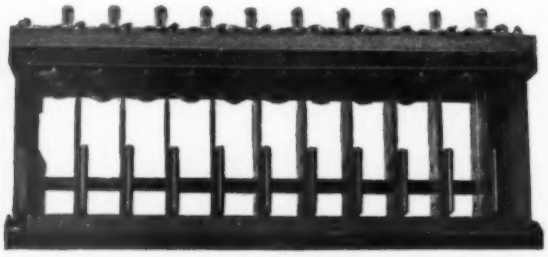
It should be noted that these heaters afford not only a convenient means of warming a room, but also one that is absolutely safe, healthful and quite economical. Of course, they give off no obnoxious gases as do portable fuel-consuming heaters and are entirely free from the serious fire hazard of the latter. They can be readily moved from room to room as needed and, all told, constitute an ideal means for room heating.

## Cutler-Hammer Charging Apparatus for Miners' Electric Lamps.

For the multitude of miners' electric lamps now used in the mines a standard easily extensible charging rack has been developed by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

Each charging rack is designed to hold ten batteries and, as each rack is a unit, an equipment may be laid out for a large number of lamps, or a small equipment can be purchased at the start and subsequently extended when additional lamps are purchased.

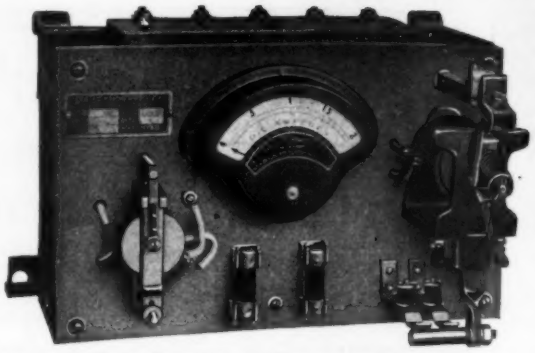
The racks are arranged to hook on brackets clamped on vertical 1¼-inch iron-pipe supports; two of these brackets are furnished with each rack and they are so designed that in adding to an equipment it is not necessary to disturb the brackets which are already in place.



Front View of Unit Charging Rack. Mushroom Contacts Are Seen Suspended from the Top.

The racks are built with a substantial steel frame which carries slate slabs on which the batteries are placed for charging. The batteries are placed in the racks edgewise, like books in a bookcase, which makes the apparatus very compact. Partitions are provided which prevent the battery cases from making contact with one another and their design is such that a battery cannot be placed in the rack with the polarity reversed. On the top of the frame is mounted a slate slab carrying the contact parts. An inverted mushroom-shaped contact piece projects below this slab and is pressed in contact with the battery terminals by a substantial coiled spring. This is the only contact which is below the slab, all other current-carrying parts being mounted on the top, where they are out of the way of any discharge from the battery vents.

The circuit through the rack is laid out so that the batteries are charged in series but provision is made by means of interpolating resistances so that one or any number of batteries can be removed from the rack without appreciably affecting the charging current through the remaining batteries. It is thus possible to remove or add batteries to a rack during the charge at will without the necessity for adjusting the rheostat. The contacts are all interchangeable and it is a simple matter to remove the mushroom contacts for inspection or cleaning should this be found necessary.



Meter Panel With Magnetic Switch and Relay to Open Circuits on Current Reversal and Automatically Close Again When V ltage is Restored.

Equally spaced contact plates are located on the front of the frame and connected to the contacts for the battery terminals. By means of a low-reading voltmeter suitably mounted and provided with contact studs spaced the same distance apart as the contact plates on the frame, it is possible to read the voltage across any battery in the rack while it is on charge without interfering with the charging circuit.

A rheostat panel is used with each set of charging racks. This panel contains a slider rheostat for adjusting the charging rate at the desired value and also carries a double-pole knife switch with a special arrangement of clips by means of which, when the switch is partially closed an ammeter is thrown into circuit, but when it is completely closed the ammeter is disconnected, the circuit then being made directly to the line. This rheostat panel can also be supplied with a relay in the charging circuit carrying contacts which will close the circuit to a signal bell, if for any reason the current on the circuit is interrupted by a poor connection or by means other than by opening the knife switch.

Large Installation of C-H Battery-Charging Equipment for Miners' Lamps at St. Michaels, Pa. Arrow Points to Battery in Rack Being Charged.

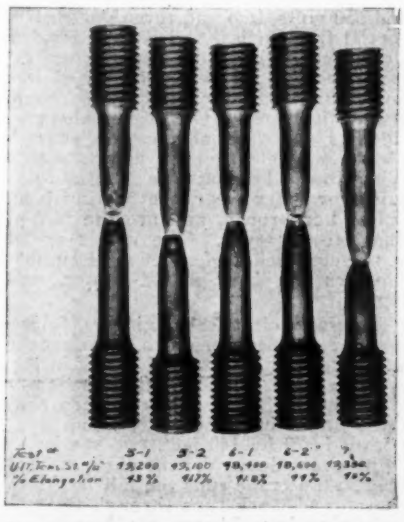
The number of charging racks that can be used with one rheostat is governed by the voltage of the charging circuit. For Edison batteries a minimum of 40 volts is required for each rack of ten batteries; thus it is possible to install six racks on a 250-volt circuit if the voltage does not fall below 240 volts. If wide fluctuations in voltage are frequent, however, it is advisable to install five racks for a 250-volt circuit in which case the voltage can fall as low as 200 volts without interrupting the charge. In the case of lead batteries, each rack requires 28 volts. It is therefore possible to install seven racks for a minimum voltage of 196 or eight racks for a minimum voltage of 224.

In planning an installation for 230 volts it should preferably be laid out with five racks to a circuit and five circuits on each frame. This gives a capacity of 250 batteries to a frame or 500 when the racks are mounted on both sides of the frame. When the batteries are handled on the checking system and the compartments of the rack are numbered, this arrangement makes it very easy to locate any compartment as there are 50 in each row and similar numbers in each hundred fall in the same vertical line. There is some loss in efficiency when fewer than the maximum number of batteries are charged on a circuit, but the charging current required is so small that it is negligible and with fewer cells on a circuit, wider fluctuations of line voltage can occur without causing trouble.

## DOES STRIKING THE ARC IN ELECTRIC WELDING INJURE THE MATERIAL?

**Tests Indicate No Reduction in Tensile Strength or Other Deterioration.**

At various times statements have been made concerning the change in the character of iron or steel after an electric arc has been struck. It has been claimed that directly under this point the material undergoes a change resulting in a poor quality of metal which is similar to burned material. This inferior part is supposed to be in the shape of a cone with the apex downward. These statements have, without exception, been made by men who are associated with the oxy-acetylene industry or by arc-welding representatives who manufacture or handle an arc-welding equipment which is designed to automatically control the current or voltage of the welding circuit.




**Four Test Pieces After Determining Effect of Striking Arc on Tensile Strength. Fifth Piece Tested Without Being Struck by Arc.**

These statements led to an investigation which was intended to determine the truth or falsity of such remarks. To completely test this point, five standard test pieces one-half inch in diameter were prepared and an arc struck on four of these pieces. In some cases the arc was merely struck and in other cases the arc was struck and carried along the test piece for a distance of an inch. During this operation no material was deposited from the electrode. The arc was merely struck and carried along the test piece. The piece on which the arc was not struck was tested along with the others. The voltage of the arc-welding circuit was approximately 60 volts, and the current approximately 150 amperes. The tests were carried out in the Westinghouse works at East Pittsburgh, Pa.

The accompanying illustration shows the specimens after they had been subjected to a pulling test. Each view shows the test number, the ultimate tensile strength in pounds per square inch and the per cent elongation. The material was common hot-rolled steel with 0.1 and 0.2 per cent carbon. Test pieces 5-1, 5-2, 6-1 and 6-2 were the ones on which the arc was struck and test piece 7 was the one which was not disturbed in any way.

The remarkable thing about the investigation was that the ultimate tensile strengths of all five pieces check closer than could be expected and that the piece which was not disturbed by the arc had a lower percentage elongation than any of the pieces on which the arc was struck.

This shows quite fully that the material on which the arc was struck underwent no structural change which would injure its original physical properties. Further, that there were no thermal disturbances set up in any way. Apparently the statements referred to above are in error, as the striking of the arc from the arc-welding circuit where the potential is 60 to 75 volts does not in any way injure or depreciate the material directly under the arc. Therefore, the inverted cone of deformed material, as mentioned by many, is very probably without sufficient foundation to cause any concern to the users of arc welding.

Another interesting investigation which was made was one in which a solid plate was reinforced throughout its entire length on one side with a deposit of metal from the electric arc. This solid plate which was reinforced was cut from a sheet of steel which had an original tensile strength of approximately 56,000 pounds. After the deposit was made the entire added material was machined off, leaving the plate of the original thickness and the original material. The sheet prepared as described was subjected to a tension test and showed an ultimate tensile strength of 59,800 pounds per square inch with 33 per cent reduction in area and 14 per cent elongation. The reduction in area in the original stock was 60 per cent and the percentage elongation was approximately 28 per cent. This test also tends to establish the fact that the tensile strength is not decreased either by the heat of welding or the striking of the arc.

These tests deprive the oxy-acetylene welders of the argument which they have often advanced and also show that automatic current and voltage-regulating devices for welding are probably unnecessary to the performance of good work. It may be stated, therefore, that the simpler the arc-welding equipment can be made, the better will be the results.

# Trade Activities

## *Manufacturers Making Installations—Instructive Catalogs Distributed—General Electric's Exhibit at New York Automobile Show*

**National Lamp Works** of General Electric Company, Cleveland, Ohio, is erecting a new factory building and warehouse to cost about $200,000.

**Allis-Chalmers Manufacturing Company** is contemplating the construction of additions to its forge shops at West Allis, Wis., to cost approximately $1,000,000.

**Phoenix Electric Company,** Mansfield, Ohio, is building a semifireproof factory on East Fifth Street. The building will be 45 by 100 feet in dimensions and will cost about $10,000.

**Pittsburgh Electric Specialties Company,** 149 Broadway, New York City, has leased property at 447 Greenwich Street and 396 Broadway, to provide for increased capacity.

**The Trumbull Electric Manufacturing Company,** Plainville, Conn., manufacturer of switches, panels, and other electrical supplies, has been elected a member of the Rice Leaders of the World Association.

**Central Electric Company,** 316-326 South Fifth Avenue, Chicago, is distributing a booklet of Christmas suggestions in things electrical. A very large number of useful and appropriate articles to be given as Christmas gifts are described and illustrated, with prices listed. Toy railways and equipment, for the children, are also shown and described.

**Edison Lamp Works** of General Electric Company, Harrison, N. J., in its December Edison Sales Builder, an attractive two-page folder, conveys Christmas greetings and dwells on two vital problems in which everyone is interested—Conservation and Efficiency. The company's plans for 1918 are outlined, based on economy and efficiency in the right direction.

**Harvey Hubbell, Inc.,** Bridgeport, Conn., is sending out Bulletin No. 16-1, on Hubbell automobile switches with flush plates. This page, showing the switches, is the same size as the Hubbell catalog, with three perforations. Four illustrations and complete description with prices of the switches are given, which were also described in our issue of November 17, page 863.

**Power Equipment Company,** Toledo, Ohio, agent for Babcock & Wilcox Company, sold much of the steam plant equipment for the large steam-electric plant of the Acme Power Company, now nearly completed in that city. Four boilers, each of 1450 horsepower, were installed, three of which are Babcock & Wilcox type. The former company also furnished the fire pump, service pump and piping. It acted as agent for the M. W. Kellogg Company, by which the three radial brick stacks, each 16 feet inside diameter at top and 275 feet high, were built.

**Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa., has just issued a booklet entitled, "Electrical Equipment for Rubber Factories," an elaborately illustrated publication with an attractive art cover. The advantages of motor drive, particularly for the calendar, are explained in some detail and a number of views of different motors and control are shown. There are a large number of illustrations of application of motors to the rubber industry, taken in different sections of the country. The equipment of the Howe Rubber Company, New Brunswick, N. J., is featured and a number of illustrations of this up-to-date plant are shown. The application of electricity to the textile industry is thoroughly described and illustrated in another booklet being issued, entitled, "Electricity in the Textile Industry." This is being distributed at the Southern Textile Exposition being held at Greenville, S. C. The publication is profusely illustrated with applications of electric motors to the industry, a number of views being shown illustrating the different methods of drive employed in textile mills. Considerable space is devoted to "Lighting," which is an important feature in all industrial establishments, especially the textile. This book will be sent free on application to anyone interested.

**Brassart Fixture Company** and **Shapiro & Aronson,** New York City, designers and manufacturers of lighting fixtures, announce that effective January 1 they will consolidate, to be known as Shapiro & Aronson, Inc. New show rooms have been established at 20 Warren Street, New York City, where a complete line of both Brassart and S. & A. fixtures are on display. Copies of Shapiro & Aronson's catalogs Nos. 19 and 20, on gas and electric fixtures respectively, will be supplied on request.

**Peake-Vander Schoor Electric Company,** 9 Fountain Street, Grand Rapids, Mich., which handles the Delco-Light units for farm lighting, states that 40 plants of this type have been installed in Kent county. The installation consists of a direct-connected gasoline or oil engine-generator set, usually of 80 amperes, and one storage battery set. The charged batteries of this capacity unit will supply 50 20-watt lamps for eight hours. The outfit is adapted to the operation of small motors about the premises, as well as for lighting.

**Appleton Electric Company,** 218-230 North Jefferson Street, Chicago, announces that Judge Geiger of the U. S. District Court at Milwaukee, Wis., has just handed down an exhaustive opinion holding that Albert I. Appleton was the first and original inventor of the modern meter box, that it satisfactorily filled a long-felt want, that Mr. Appleton's patent, No. 1,119,057 was good and valid, and that it is infringed by the watt-meter box manufactured by the P. & B. Manufacturing Company. The Court also decided that the P. & B. Manufacturing Company had been guilty of unfair competition in trade, and ordered the defendant to pay the costs of suit and recompense the Appleton Electric Company for all damages.

**Howell Electric Motors Company,** Howell, Mich., manufactures a polyphase induction motor of a special electrical design which secures a mechanical reliability without sacrificing power-factor, efficiency and overload capacity. These motors are wound for operation on 110, 220, 440 and 550 volts, two and three phase circuits, and of all commercial frequencies, and standards of speed. The company confines itself to the manufacture of polyphase induction motors. In the construction of its type B of 30-horsepower and less, the stator core laminations are riveted under high pressure between heavy end frames. Stator windings are of double cotton enameled magnet wire, affording double protection against electrical breakdowns. The Howell bearings are such as to give unusual safety against ordinary wear, the bearing bushings being made of phosphor bronze, and are the two-piece, rotor-re-centering, oil-ring type. The rotors are the squirrel cage type, the core being of sheet steel laminations. This company makes the back-geared motor, and those of vertical type.

**Gray & Barash,** electrical engineers, formerly located at 316 First Avenue, Seattle, Wash., have moved into elaborate new quarters at 63 Hanford Street in the same city, this move being necessitated by the demands of an ever-increasing business. These quarters when completed will cover almost an entire block. The machine shop with offices in front is 79 by 140 feet, two stories and is being equipped with every device for the efficient handling of the business. A 20-ton crane runs the full length of the structure and a railroad track runs through the center for the loading and unloading of heavy equipment. A 35 by 165-foot warehouse stands at the rear similarly equipped and has a full stock of motors and other electrical machinery. A 25 by 50-foot office building is being erected at the front and to the left of the machine shop and back of this will be erected a second warehouse 25 by 60 feet for storage of patterns and other uses incident to the business. Lighting and other sanitary arrangements have also been given special consideration, and the plant when completed will be one of the best equipped on the Pacific Coast for handling both large and small electrical installations.

**The Bearings Company of America,** Detroit, Mich., announces that recently additions were completed at its Sterling universal-joint plant at Lancaster, Pa. By completion of these additions the space for offices at the plant has been practically doubled, and the building used for a mess hall and assembly and recreation room for the employees of the plant has also been completed and formally opened, thus making the Sterling plant one of the most modern and up-to-date universal-joint factories in the United States.

**Philadelphia Storage Battery Company,** Philadelphia, Pa., has opened a branch office and depot at 37 Spear Street, San Francisco, Cal., in charge of A. P. Clark. C. L. McWhorter, manager of the company's Pacific Coast Division, will make his headquarters at the San Francisco office. The company manufactures the famous Philadelphia Diamond Grid batteries, for use in electric pleasure and commercial cars and for starting, lighting and ignition on gasoline cars, and the new branch office will carry a complete stock of starting batteries for all automobiles and plates for assembling vehicle batteries. The Los Angeles office is in charge of Arthur Affeld.

**The W. G. Nagel Electric Company,** 28-30-32 St. Clair Street, Toledo, Ohio, besides acting as sales agent for Sprague Electric Works of General Electric Company, maintains a department for overhauling, repairing, and, if necessary, reconstructing, used and damaged motors and generators. A shop on the fourth floor of the building, fully occupied by the company, is employed entirely in this branch of repairing and rehabilitating, where there are machine tools, a heating oven and testing facilities. Under this business plan motors and generators of the used or partly disabled class, which may be purchased, are put in condition fit for operating before they are offered for sale. This method serves to utilize otherwise discarded equipment, and puts the sale of it on the best possible basis.

**Ivanhoe-Regent Works** of General Electric Company, Cleveland, Ohio, has made its December number of its monthly house organ, The Hunchman, especially appropriate for the holiday season by attractive cover designs and an unusually large number of fine cuts in the interior. Especially featured are a number of new designs of the Ivre Rozelle ornamental glass shades. This glass is the color of ivory and has a sand-blasted surface to give the effect of a soft, rich texture. It is decorated with designs of butterflies, flowers and other suitable ornamental features. Two pages show the new blue and white medallion designs in Rozelle glassware, bowls and shades. The Ivanhoe-Reflecto-Cap diffuser is described and illustrated and the results of tests of this very efficient and unique type of unit are given. The usual bright comments by the "Ofis" boy fill a page.

**General Electric Company** will have an exhibit in booths D36 and D37, at the New York Automobile Show, Grand Central Palace, next month. This exhibit will consist of the company's storage-battery recharging apparatus for use in public and private garages. Several sizes of type MIC, Form D motor-generator sets with control panels and also Tungar rectifiers will be shown. These two classes of apparatus, which have been described in the columns of the ELECTRICAL REVIEW, operate on the usual commercial circuits and supply direct current of the proper characteristics for recharging. The outfits consist of a small motor-generator set (either alternating or direct-current motor coupled to direct-current generator) with small steel switchboard panel mounted thereon. The switchboard panel has a voltmeter for indicating the voltage and an ammeter for indicating the amperes of the charging current delivered to the batteries being charged. There is also a generator field rheostat for controlling the charging voltage and curent, and a snap switch arranged to open or close both charging and motor circuits at a single turn.

**Bridgeport Brass Company,** Bridgeport, Conn., is one of the first companies to inaugurate a plan of group life insurance for workers of industrial plants, including benefits for accidents and sickness along the line of the compensation laws of some states. The Sick Benefit Association of the company has issued a booklet entitled "A Co-Operative Plan of Benefits Covering Accidents, Sickness and Death." Under this plan of the company any employee may receive one-half of his or her wages, up to a certain maximum, for a period not to exceed 26 weeks, for disability or sickness, and a maximum life insurance policy of $1000; also medical services and definite payments in case of death and loss of limbs from accident while in the shop in the performance of their duties. There is no provision, however, for loss of time from accidents occurring outside of the factory. Employees who belong and contribute to the sick benefit are furnished with life insurance certificates without cost to them. Those completing six months' service with the company are entitled to a $500 certificate; one year's service, $600; two years' service, $700; three years' service, $800; four years' service, $900, and five years' service, $1000. Complete details of the plan are given in the booklet.

**Westinghouse Lamp Company,** 165 Broadway, New York City, has published a unique book entitled "Modern Methods in Textile Mills," written by Eugene Szepesi. It is a 54-page illustrated book, well printed and cloth bound. Although written candidly to further the propaganda for better industrial lighting, the book is an unusual piece of such literature. In place of a mass of technical lighting data and arguments, the author has put into his story touches of human interest that hold the keen attention of the reader throughout the eight short chapters. While showing the growth and importance of modern mill methods, he discloses his intimate acquaintance with textile-mill practice, both past and present, and thereby increases the force of his appeal to mill owners and managers. Special emphasis is given to the value of good lighting to efficient work, to efficient and contented workers, to minimizing of spoilage and accidents, to preparation for emergencies and forced night work, and to economy in production. This book is the third of a series of nontechnical books on good factory lighting, the two earlier books published being entitled "Successful Industrial Management" and "Increasing and Improving Production." The Westinghouse Lamp Company is to be congratulated on this successful method of appealing to textile-mill and other factory owners in their own language and not that of the illuminating engineer—a factor that may account partly for the very large number of inadequately and improperly lighted factories one still sees every day.

**Packard Electric Company,** Warren, Ohio, has recently completed an important Government contract calling for a number of standard, heavy-duty transformers of various capacities. The accompanying illustration shows three of these ready for shipment. In submitting this illustration the Packard company states: "The illustration will serve to reconcile users of electrical equipment

Shipment of Packard Transformers for Uncle Sam.

to the delays their orders have been subjected to, owing to priority of Government contracts. The electrical industry is being extended to the limit in this direction and the Packard company has been doing its bit along with the rest."

**National Regulator Company,** Chicago, Ill., has developed an improved type of motor-operated air compressor made in different sizes for use on commercial circuits. It is especially adapted to the requirements of residences, office appliances, manufacturing plants, and physicians' and dentists' offices, where the service is not heavy. The compressor is designed for low-speed services, since the special class of work that it does forbids overheating the air. It is practically noiseless. This type of compressor generally is controlled automatically to maintain a constant pressure and is driven by a fractional-horsepower motor made by the General Electric Company. This motor is standard equipment. The apparatus is a unit and has a panel on which are mounted the pressure governor, high and low-pressure gauges and the safety valves. The storage tank has a capacity equal to about 10 gallons of liquid.

# Latest Approved Fittings

**Cabinets and Cutout Boxes—Weatherproof.**—The Johns-Pratt Company, Hartford, Conn., the H. W. Johns-Manville Company, New York, N. Y., sole agents.

"Noark" service-entrance boxes.

"Weatherproof," 0-30 amperes, 250 volts, catalog Nos. 3665-66.

"Watertight." Covers of boxes fitted with attachments whereby opening of box may cause fuses to be withdrawn. 61-600 amperes, 250 volts, catalog Nos. 3678-85, inclusive; 0-600 amperes, 600 volts, catalog Nos. 5770-77, inclusive, 5868-71, inclusive.

"Noark" fuse boxes.

"Weatherproof," 0-100 amperes, 250 volts, catalog Nos. 3810-15 inclusive, 3840-42 inclusive, 3860-62 inclusive; 0-100 amperes, 600 volts, catalog Nos. 5850-55 inclusive.

"Watertight," 61-600 amperes, 250 volts, catalog Nos. 3670-77 inclusive; 61-600 amperes, 600 volts, catalog Nos. 5760-67 inclusive.

Listed October 26, 1917.

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**Conduit, Flexible Steel.**—Triangle Conduit Company, 50-54 Columbia Heights, Brooklyn, N. Y.

Marking: Triangle stamped on every second convolution.

Listed October 16, 1917.

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**Conduit Boxes.**—National Metal Molding Company, Pittsburgh, Pa.

Pressed-steel conduit boxes. "National," catalog No. 2844.

Listed November 10, 1917.

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**Fixtures.**—The American Fixture Company, 232 West Water Street, Milwaukee, Wis.

Adjustable electric fixtures, ceiling, wall, bench or floor. "American."

Listed October 11, 1917.

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**Fixtures.**—Falkenbach Manufacturing Company, Inc., 159 East 54th Street, New York, N. Y.

Listed October 26, 1917.

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**Fixtures, Vaporproof.**—H. T. Paiste Company, 32nd and Arch Streets, Philadelphia, Pa.

Types V, VA, VB, VC, VGA, VH, VHA, VHB, VHC, VHGA, VHL, VHT, VHX, VL, VT, and VX.

Listed October 31, 1917.

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**Fuses, Cartridge.** — Metropolitan Electric Company, Boulevard and 14th Street, Long Island City, N. Y.

"Metropolitan," cartridge inclosed fuses, 0-60 amperes, 250 volts.

Listed October 23, 1917.

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**Fuses, Plug.**—Bussmann Manufacturing Company, 3819 North 23rd Street, St. Louis, Mo.

"Halja," all porcelain, 0-30 amperes, 125 volts.

Listed November 9, 1917.

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**Fuses, Plug.**—Trenton Electric & Conduit Company, Trenton, N. J.

"Trenton," 0-30 amperes, 125 volts.

Listed November 9, 1917.

*The electrical fittings listed and described in this department have been approved by the Underwriters' Laboratories, Incorporated, after examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.*

**Heaters—Electric Range.**—Charter Oak Stove & Range Company, Antelope and Conduit Streets, St. Louis, Mo.

"Charter Oak" electric range, 6.3 kilowatts, 110 volts, catalog No. 8-R.

Note: In the installation of this device it is considered desirable, from standpoint of safety to persons, that framework be permanently and securely grounded, a soldering lug being provided on each device for this purpose. The same protection for surrounding materials should be observed in installation of these devices as are applied to stoves of other types used commonly for cooking.

Listed November 30, 1917.

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**Heating Appliances, Cooking and Liquid.** — Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Nursery milk warmer, 500 watts, 100-125 volts, style 146282-A.

Listed November 24, 1917.

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**Panelboards.** — Trumbull Electric Manufacturing Company, Plainville, Conn.

"Trumbull Safety Type Panel," consisting of an assembly of units, each consisting of two double-pole snap switches and two pairs of plug fuse cutouts, and of connecting buses and slate barriers. For inclosure in a standard cabinet.

Listed October 19, 1917.

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**Receptacles for Attachment Plugs, and Plugs.**—Gordon Electric & Manufacturing Company, 430 South Green Street, Chicago, Ill.

Flush receptacle, Edison type, 660 watts, 250 volts, catalog No. 1708.

Listed October 19, 1917.

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**Signs.**—The Elwood Myers Company, Springfield, Ohio.

Electrically illuminated display signs for general use.

Listed October 16, 1917.

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**Socket Linings.**—C. L. Sherman, 5142 Master Street, Philadelphia, Pa.

"Fibreo." Linings for sockets and receptacles.

Listed November 6, 1917.

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**Sockets, Candelabra and Miniature.** —Bryant Electric Company, Bridgeport, Conn.

"Bryant" or "Perkins" candelabra. Metal shell, pull, catalog No. 540; turn, catalog No. 560.

Listed October 22, 1917.

**Sockets, Medium-Base.** — Harvey Hubbell, Inc., Bridgeport, Conn.

"Hubbell" porcelain shell.

Key, catalog No. 4375.

Listed October 17, 1917.

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**Switches, Automatic, Clock-Operated Type.**—Absosure Time Switch Company, 26 Pasadena Avenue, Detroit, Mich.

Automatic switch consisting of clock mechanism, connecting gear and standard knife switch inclosed in metal case, and designed to open or close circuits at a predetermined time. "Absosure," 10 amperes, 250 volts or less.

Listed October 19, 1917.

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**Switches, Enclosed.**—The Palmer Electric & Manufacturing Company, 60 K Street, Boston, Mass.

Two, three or four-pole service switches and cutout bases for standard cartridge enclosed fuses, enclosed in metal cases and designed for manual operation without opening cases. When cases are open fuse terminals and all accessible parts are "dead," eliminating possibility of shock to operator in replacing or inspecting fuses.

"HP" 30, 60 amperes, 250 volts, direct current or alternating current; 30, 60 amperes, 500, 600 volts, alternating-current, catalog Nos. 2001-06 inclusive, 2061-21 inclusive, 2025-30 inclusive.

Listed September 12, 1917.

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**Transformers, Toy.** — Jefferson Electric Manufacturing Company, 426 South Green Street, Chicago, Ill.

Air-cooled transformers designed to supply current at following voltages; for use only when provided with portable flexible cord permanently connected to primary side and having standard attachment plug attached.

"Type O," 25 watts, primary 110 volts, secondary 4-12 volts, 60 cycles.

"Midget," 50 watts, primary 110 volts, secondary 2½-25 volts, 60 cycles.

"Type 1," 75 watts, primary 110 volts, secondary 2-20 volts, 60 cycles.

"Type 2," 100 watts, primary 110 volts, secondary 1½-24 volts, 60 cycles.

Listed September 29, 1917.

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**Transformers, Bell-Ringing.** — Jefferson Electric Manufacturing Company, 426 South Green Street, Chicago, Ill.

60 cycles. Primary, 110 volts; secondary, 6, 12, 18 volts, "Trivolt."

Listed August 14, 1917.

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**Transformers, Bell-Ringing.**—Viking Electric Company, 150-152 Chambers Street, New York City.

"Little Giant." Primary 110 volts, secondary 6, 10, 16 volts.

Listed August 29, 1917.

# Men in Service

## *Standard Underground Cable and Herman Andrae Companies Well Represented—Service Flag of Toledo Railways & Light Company*

JOHN M. COSTELLO, formerly superintendent of the plant of the Salmon River Power Company, Pulaski, N. Y., has been commissioned a first lieutenant in the United States Army.

WALTER L. VANAMAN, wire chief for the Philadelphia & Reading Railway Company, Harrisburg, Pa., has been made Master Signal Electrician with the 314th Provisional Battalion, United States Signal Corps.

MARK T. MILNOR, Harrisburg, Pa., connected with the legal force of the Public Service Commission, has been appointed to the supply division of the United States Medical Service, and will be stationed at New York during the war.

J. E. AVERBACH, manager of the Detroit, Mich., office of the Iron City Engineering Company, of Pittsburgh, Pa., has been given a leave of absence to accept a temporary appointment as first lieutenant in the Signal Corps of the Army.

ROSE POLYTECHNIC INSTITUTE, Terre Haute, Ind., a college of electrical, mechanical and civil engineering, also chemistry and architecture, in its November issue of The Rose Technic, gives the names, ranks and commissions of 19 Rose men in Government service.

LOUISVILLE GAS & ELECTRIC COMPANY reports three of its employees having received commissions as a result of their training at the Second Officers' Reserve Camp, who are Robert Montgomery and Fulton Mandeville, first lieutenants, and Walter L. Dawkins, second lieutenant.

ARTHUR E. ALLEN, connected with the Westinghouse Electric & Manufacturing Company in the capacity of manager of the supply department of the New York district office, has resigned to join the Royal Engineering Corps in Canada. He is succeeded by Charles E. Stephens, formerly in charge of the illuminating and rectifier division at East Pittsburgh, Pa.

JOHN G. GALLOWAY, a noted consulting engineer of San Francisco, has been called into active service as a major in the United States Engineer Corps. He is in the East now and it is anticipated that he will see early service in France. He has long been active on the Pacific Coast as an engineer and among other notable achievements was the consulting engineer for the building of the famous Carquinez Crossing of power lines for the Pacific Gas & Electric Company near Benicia, Cal., which, although built ten years ago, is still the longest single span of wire in the world. Recently he has been an active figure in organizing local military and defensive efforts.

FIRST LIEUT. H. W. MARKS, formerly superintendent of the Columbia Telephone Company, Columbia, Pa., has been assigned to the 324th Field Signal Battalion at Camp Meade, Md. Since receiving his commission as lieutenant he has been stationed at Camp Alfred Vail, Little Silver, N. J.

**ROLL OF HONOR.**

***The electrical industry, perhaps to a greater extent than any other industry, has answered the call of the Nation for men. As this is a war of engineers, naturally the technically trained men in the electrical industry have been in great demand and they have responded with splendid patriotism. Many of the large utility and industrial corporations have assigned men for Government service aside from those who have voluntarily entered or been called for service.***

**THE ELECTRICAL REVIEW will *welcome news concerning men who have entered the service or who are engaged in any patriotic duties.***

CLYDE E. BARNES, mechanical engineer of the Spokane & Seattle Railway, which controls the Spokane & Inland Empire Railroad, the Oregon Electric Railway, the Pacific & Eastern Railway, the United Railways and the Oregon Trunk Railway, has enlisted in the United States Navy, at present being in the Philadelphia Navy Yard, to qualify for service in the naval patrol.

AMERCAN SMELTING & REFINING COMPANY and AMERICAN SMELTERS SECURITIES COMPANY devotes its December issue of Safety Review to listing the names of employees and officers on its honor roll. The companies have given 1,147 of their men for service of the United States and our Allies. The Baltimore plant has parted with the greatest number, the names of 285 being mentioned as having left that plant. The office each employee enlisted from, nature of position held, and branch of service now in are given.

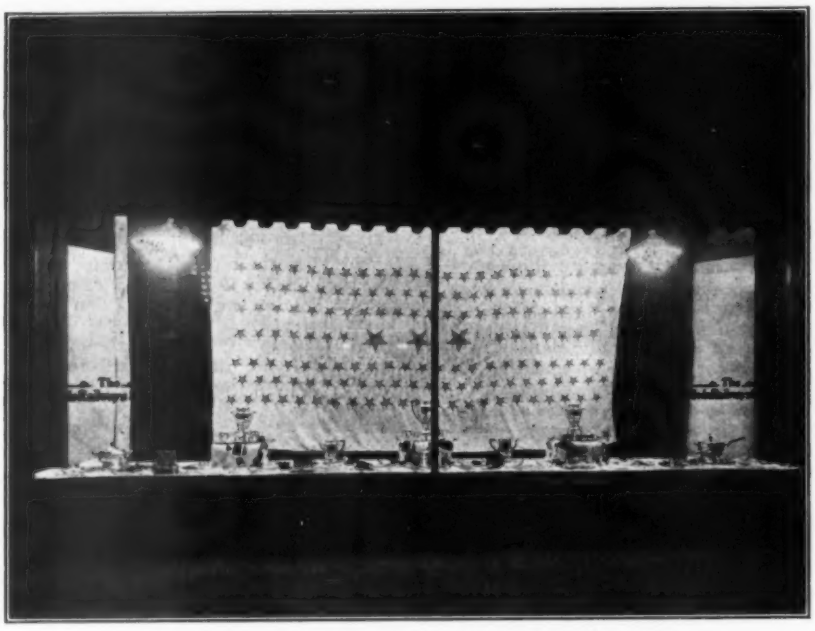
HERMAN ANDRAE ELECTRCAL COMPANY, INC., 135 Sycamore Street, Milwaukee, Wis., is represented in Government service by the following employees: C. A. Hendee and J. Harvey Anderson, former estimators of the company, are in the U. S. Navy, being stationed at the Mare Island Navy Yard, and the following electricians: W. Kuehlthau, in the Navy; William Gast, at Waco, Tex.; George Windus and Lee Cox, at Camp Custer, Battle Creek, Mich.; Henry Wulff, William Huebner and Herman Lange in the Army.

MAJ. LYNNE E. MASON, S. R. C., was the guest of honor at a Thanksgiving celebration by the members of Company B, of the 313th Field Signal Battalion, located at Camp Dodge, Ia., in honor of his promotion from the captaincy of Company B to that of major in command of the battalion. Maj. Mason formerly was manager of the Kansas Telephone Company at Lawrence, Kans.

W. H. CLIFFORD, superintendent of the heat, light and power company of Palestine, Tex., who was district organizer of the Second Liberty Loan campaign, has gone to Washington, D. C., where he will attend a conference of Federal Reserve Bank officials, relative to the plans for organizing and carrying through the Third Liberty Loan campaign.

STANDARD UNDERGROUND CABLE COMPANY'S honor roll of employees now in military service contains 48 names, classified as to offices and factories as follows: Pittsburgh—D. G. Cameron, T. J. Haworth, Jr., W. R. Carlisle, William Cummings, Frank Firestine and T. B. Harvey, all at Camp Lee, Petersburgh, Va.; R. Butterfield, U. S. N. R. F. Wissahickon Barracks, Cape May, N. J.; R. M. Cornell and J. H. Edwards, 1st lieutenants, Reserve Officers' Signal Corps, R. O. T. C., Little Silver, N. J.; D. M. Simons, captain, Camp McClelland, Anniston, Ala.; Joseph Sloss, Camp Hancock, Augusta, Ga.; H. A. White, R. O. T. C., Ft. Niagara, N. Y.; John C. Davidson, Company B, Engineering Corps, Somewhere in France. New York City—V. J. Burger, observer in Aviation Corps, Garden City, L. I. Philadelphia—Lloyd M. Stout, acting sergeant 312th Field Artillery, Camp Meade, Md. Chicago—Elbert F. Norton, major in Sixth Company, Engineer Officers' Training Camp, Ft. Leavenworth, Kans. Los Angeles—William G. Christy, 322d U. S. Field Battalion Signal Corps, Camp Lewis, American Lake, Wash. Pittsburgh Factory—Raymond Hock, musician, 320th Infantry Band, and Patrick McDonough, Machine Gun Battery, Company A, 315th Infantry, both at Camp Lee, Petersburg, Va. Oakland (Cal.) Factory—E. Mueller, sergeant, and M. Fickes, corporal, both of 143rd Field Artillery, Camp Kearney, San Diego, Cal.; Charles DeLong, Camp Lewis, American Lake, Wash. Perth Amboy (N. J.) Factory—N. Tollis, T. Ostvorwski, J. Budny, J. Wilkanowski, H. Baumann, Stephen Moken, John Gregory and T. N. Wierum, all at Camp Dix, Wrightstown, N. J.; B. Mayo, Aviation Corps, Mineola, L. I.; M. Kwiatkowski, E. Flowers, R. Zolnick, L. Morgan and T. Skrzypczak, all at Camp McClelland, Anniston, Ala.; T. Pooni, W. Zuker and John Peters, Somewhere in France; A. Joth, Panama Canal; V. Tabrovics, Kansas City, Mo.; J. Lukie, R. Miller, William Desmond, U. S. S. Georgia, all of U. S. Navy; S. E. Mayo, Company D, 20th Field Artillery, Camp Stanley, Leon Springs, Tex.; H. Nipor, Harold Cahen, and A. Chapele, present addresses unknown.

TOLEDO RAILWAYS & LIGHT COMPANY, Toledo, Ohio, in the display window of its new business department is displaying a service flag with 167 stars, proclaiming the number of patriotic young men of the organization who have answered the call to the Army and Navy in this time of the nation's peril. Since this flag was unfurled, 15 others have joined the service, for whom 15 more stars are to be added.



Service Flag Displayed by Toledo Railways & Light Company.

LESLIE R. COFFIN, manager of the Whatcom County division of the Puget Sound Traction, Light & Power Company since 1910, with headquarters at Bellingham, Wash., has reported for duty at the American International Corporation's office in Philadelphia, Pa., in which company officers of Stone & Webster are interested. J. C. Hector, assistant treasurer of the Puget Sound company, will be Mr. Coffin's temporary successor at Bellingham.

IDEAL POWER for December, the monthly publication of the Chicago Pneumatic Tool Company, published in the interest of compressed air and electrical appliances, gives 75 names on the company's roll of honor as follows: Chicago Heights plant—J. W. Biggars, P. Brundage, W. Dill, R. Ervin, R. Greiner, Steve Herman, E. L. Kordeck, S. Latouski, J. May, C. Meyers, J. Meyers, V. Morton, N. Neal, M. Peddycord, R. Roddy, D. Sattozalein, Lee Van Keuren. Cleveland plant—Andy Alf, Frank Becan, Henry Beck, Albert Bohnsack, C. C. Cole, Wilford Hollam, Frank Kmetz, Miles McClintook, W. B. Miller, Herman Sperry, Lee Sutton, Joseph Swegel, Ben Wismiewski. Detroit plant—Earl Anderson, John Barberi, Walter Ellerholz, Orin Faber, Steve Jablowski, James Mulholland, Harry Page, Jesse Stalker. Erie office—G. R., Smith. Franklin plant—George Allen, Wm. B. Brown, C. E. Clynes, Floyd Cotterman, F. S. Cox, Max Dailey, Rush Felt, Coulter H. Hoffman, Rex Hoffman, Harry J. Johnson, Harry W. Johnson, James Porter, George B. Ross, John D. Ross, J. Hallock Speer. General office—George F. Bryant, F. E. Giles, A. Hoppe, Norman Johnson, K. H. Kittoe, T. R. Punnett, I. S. Schuster, M. L. Staley, E. F. Sweeney, Conant Wait, Percy Woolf (British Navy). New York office—Charles Aldcorn, G. E. Allen. Pittsburgh office—J. L. Canby. St. Paul office—Robert D. Lewis. San Francisco office—D. C. DeHart, Harrison Gans, L. J. Gilmeister, F. E. Granger, E. C. Mitchell, L. P. Stephenson.

THE MILWAUKEE JOVIAN LEAGUE, Milwaukee, Wis., lists six of its members in service, as follows: G. F. Kiewert, 1st lieutenant, 329th Machine Gun Battalion; Howard Logan, 1st lieutenant, Ordnance Reserve Corps; B. Berssenbrugge, 1st lieutenant, Engineer Corps; H. L. Schwind, 121st Heavy Artillery; H. N. Woods, 7th Company, 10th Regulars, and Ervin E. Kiefert, Field Hospital Corps No. 340.

UNITED GAS & ELECTRIC ENGINEERING CORPORATION, 61 Broadway, New York City, in its Christmas Number of The Bulletin lists the names of 287 of its men, who have left the organization to serve their country. The location and number from each subsidiary company represented are as follows: Birmingham—Birmingham Railway, Light & Power Company, four; Bloomington—Union Gas & Electric Company, two; Buffalo—International Railway Company, 50; Colorado Springs—Colorado Springs Light, Heat & Power Company, five; Elmira—Elmira Water, Light & Railroad Company, 10; Harrisburg—Harrisburg Light & Power Company, two; Houston—Houston Lighting & Power Company, 18; Houston Gas & Fuel Company, 12; Knoxville—Knoxville Railway & Light Company, nine; Lancaster (Pa.)—Conestoga Traction Company, 19; Edison Electric Company, six; Lancaster Gas, Light & Fuel Company, five; Leavenworth—Leavenworth Light, Heat & Power Company, one; Little Rock—Little Rock Railway & Electric Company, 23; Lockport—Lockport Light Heat & Power Company, one; Memphis—Memphis Street Railway Company, 52; New Orleans—Consumers Electric Light & Power Company, five; New Orleans Gas Light Company, four; New Orleans Railway & Light Company, 45; New York—United Gas & Electric Engineering Corporation, four; Richmond—Richmond Light, Heat & Power Company, one; Terre Haute—Citizens Gas & Fuel Company, two; Wilkes-Barre—Wilkes-Barre Company, seven.

B. J. CALDWELL, vice-president of the Caldwell Electric Corporation, Champaign, Ill., has been commissioned by the Navy Board as one of 100 electrical engineers of the country to do electrical engineering work for the Navy. Mr. Caldwell is a graduate of the college of engineering of the University of Illinois, in the class of 1911, and since that time has been electrical engineer for the Caldwell Electric Corporation. He was recommended to the Government by the American Institute of Electrical Engineering, of which he is a member.

BELL TELEPHONE COMPANIES' December issue of the Southern Telephone News contains many interesting items regarding its men in service, who have enlisted from Bell companies located throughout the South. Large group photographs are reproduced of Companies D and E, 402d Telegraph Battalion, Signal Corps, and the same pages give separate photographs of Maj. Gen. Charles H. Bailey and Maj. Van Dorn. On another page six portraits of men of the Home Telephone & Telegraph Company, Henderson, N. C., are reproduced, who are: E. S. Williams, formerly plant man at Oxford, N. C., now with machine gun company of the Third N. C. Infantry at Camp Sevier, Greenville, S. C.; J. O. Bunn, formerly plant man at Louisville, N. C., now a 1st sergeant in the Signal Corps, at Camp Sevier, Greenville; Carl Whitehurst, formerly a construction foreman, now with the Fifth Telegraph Battalion of the Signal Corps and last heard from at Monmouth Park, N. Y.; F. L. Toepleman, construction foreman, has received a commission as 2d lieutenant and assigned to duty at Camp Jackson, S. C.; S. G. Boddie, plant foreman at Henderson, N. C., is 1st lieutenant of the Henderson Company of the 3rd N. C. Regiment and is stationed at Camp Sevier, Greenville; J. V. Caffrey, plant man from Beaufort, N. C., has joined the marines and is stationed at Norfolk, Va.; J. S. McLohon, plant man from Henderson, N. C., is with Troop A of the First Virginia Cavalry at Camp McClellan, Anniston, Ala. The inside page of the cover of this issue of the News contains President Theo. N. Vail's splendid Christmas message on serving our country, addressed to Bell Telephone Company's employees, men in Government service and to the public in general, and is graced by his portrait.

The announcement has come from France that the officers of the Bell Telephone system in New York, Chicago, Philadelphia and Pittsburgh will receive unusual Christmas presents. These will come from the telephone detachment now in France, which was supplied by the company. The presents will be letter racks, paper weights and similar souvenirs made from the aluminum frame work of the Zeppelin L-49, recently brought down. Into these will be ingeniously wrought the ends of the wires cut off in connecting up the telephones installed in Gen. Pershing's private office at headquarters. These souvenirs are partly in acknowledgment of the Christmas boxes received from the Bell company and marked, "Do Not Open Before Christmas."

# Personal

## *G. J. Wagner Appointed Engineer for Grand Rapids—Fred M. Rosseland Elected President of Chicago Electric Club—D. J. Angus Joins Esterline Company*

G. A. PETERSON of Baltimore, Md., has been appointed manager of the Philadelphia branch of the A. B. See Electric Elevator Company.

WILLIAM H. FRANK has been appointed commercial manager for the Lebanon Gas & Fuel Company, Lebanon, Pa., succeeding Mr. E. S. Palmer, who resigned due to ill health.

J. W. TABB, formerly manager at the Buffalo office of the Western Electric Company, has been transferred to the New York City branch. He has been succeeded at Buffalo by G. A. Schneider, formerly of the San Francisco sales organization.

JOHN HAYS SMITH, Pittsburgh, Pa., has been appointed assistant engineer for the State Public Service Commission, Harrisburg, Pa. Mr. Smith was connected with the Westinghouse interests for seven years, and was one of the editors of the Electrician and the Electrical Age.

G. J. WAGNER, recently appointed city engineer for Grand Rapids, Mich., graduated in electrical engineering at the University of Michigan in 1910. His first engagement was in the capacity

Gerald J. Wagner.

of engineer for the Metropolitan Street Raliway Company, New York City. During 1911 and 1912 he served as assistant superintendent for the Grand Rapids & Muskegon Power Company, and later became construction engineer for the Michigan Railway Company, having charge of the work on that company's Kalamazoo-Grand Rapids line, and the electrification of the Allegan-Battle Creek road. His more recent work for that company was in building its track extensions and overhead equipment at Camp Custer, near Battle Creek, and supervision of building construction.

C. M. BREWSTER, manager of the Western States Gas & Electric Company, Richmond, Cal., has been appointed chairman of the membership campaign of the annual Red Cross drive for new memberships.

NORMAN STEWART, formerly with the Electrical Contracting Company of Minneapolis, and ANDREW NELSON, of the Minneapolis General Electric Company, have both accepted positions with the Chicago district office of the Westinghouse Electric & Manufacturing Company.

J. F. PRITCHARD, who has been connected with the Eastern Wisconsin Electric Company and its predecessor, the Eastern Wisconsin Railway & Light Company, for the last four years, has tendered his resignation and accepted a position with William A. Baehr, consulting engineer, 122 South Michigan Avenue, Chicago.

GEORGE A. GALLIVER has resigned as president of the Central States Electric Corporation, 60 Broadway, New York City, to become vice president and general manager of the American Writing Paper Company. He has been succeeded by F. L. Dame, formerly vice president. R. P. Stevens has been elected in place of Mr. Galliver on the board of directors of the Central States Electric Corporation.

CHARLES H. PARKER, who has been in the employ of the Edison Electric Illuminating Company, Boston, Mass., since 1895, recently was appointed superintendent of the generating department. He had been assistant superintendent of the department since 1900, under the inspiring leadership of William P. Hancock. Mr. Parker is a member of the American Society of Mechanical Engineers, American Institute of Electrical Engineers, Boston Society of Civil Engineers, National Electric Light Association, and was chairman of the Steam Turbine Committee of the Association of Edison Illuminating Companies for several years. He is a member of St. Botolph, Engineers', and Country Clubs. He enlisted in the Massachusetts Naval Battalion in 1892 as a seaman in Company C, serving as coxswain, quartermaster and boatswain's mate. In 1896 he was elected ensign and served in the Spanish war as ensign and lieutenant, junior grade, on the U. S. S. Catskill and U. S. S. Marcellus. He was lieutenant chief of C Company, Naval Brigade, from 1899 to 1904, retiring as lieutenant-commander. In 1908 he was appointed engineer member of Naval Bureau at State House, with rank of commander, and retired in 1912 with rank of captain. Since the United States entered war he has served on the Massachusetts Public Safety Committee as member of Naval Committee and has been appointed acting chief of the Department of Naval Militia.

FRANK O. WALLENE has been appointed district manager of the Cleveland office of the Electric Machinery Company, Minneapolis, Minn. This office was recently established.

F. R. COATES, president of the Toledo Railways & Light Company, Toledo, Ohio, and chairman of the Toledo Board of National Defense, is one of a committee of ten citizens of Ohio, appointed by Governor Cox, to visit and inspect the military training camps at Fort Sheridan, Alabama, and Camp Sherman, Chillicothe, Ohio. This committee visited those camps early in December.

FRED M. ROSSELAND, who was elected president of the Electric Club-Jovian League of Chicago, at its meeting on December 13, is safety engineer for the National Safety Council, a position for which he is eminently fitted because of his long experience in safety work. Mr. Rosseland is well known in the electrical industry in the Middle West and is one of the most popular members of the Electric Club-Jovian League. He was secretary in 1913 and for the last half of 1915 and served on the Board of Managers in 1914. He has been chairman of numerous committees and has done much to build up the organization

Fred M. Rosseland.

to its present high standing. Mr. Rosseland is a native of Chicago and a graduate of Lewis Institute. His first position was with F. B. Badt & Company and then with the General Electric Company at Chicago. He resigned from this position to enter the field of safety engineering, accepting a position as safety inspector with the Chicago Telephone Company. He was secretary of the Chicago Safety Council for 1917 and was elected president for 1918.

B. J. DENMAN has been elected president of the Tri-City Railway & Light Company, Davenport, Iowa, after an experience in the utility field dating

back to 1891. He began service in that year with the Toledo Consolidated Railways Company, Toledo, Ohio, and was employed in various capacities until 1895. From 1895 to 1899 he attended the University of Michigan, taking the courses in electrical and mechanical engineering. During that same period he was employed as electrician with the Toledo & Maumee Valley Railroad Company, dividing his time between the service of the company and his college work. While this was naturally a difficult task, Mr. Denman persevered until 1899 when he was awarded the degree of electrical engineer by the University of Michigan. From 1900 to 1901 he was instructor in the University of Toledo and was also engaged in engineering work in that city with W. G. Clark under the firm name of Clark & Denman. From this connection Mr. Denman went to the Toledo, Bowling Green & Southern Traction Company as electrical engineer, remaining in that capacity until 1904. In that year he went to Detroit, Mich., and gained an interesting and profitable nine years' experience with the Detroit Edison Company, serving in many capacities, such as commercial engineering, appraisals and in actual engineering construction work and for some time acted as chief engineer of power plants. He also had charge of the construction of Delray Plant No. 2 of this company and the reconstruction of Plant No. 1, the total capacity being 100,000 kilowatts. In 1913 he began his work with the company he is now with, being elected vice-president and general manager of the Tri-City Railway & Light Company, Davenport, Iowa, and vice-president of its numerous subsidiary plants, these being the Peoples Light Company, Davenport, Iowa; Muscatine Lighting Company, Muscatine; Iowa City Light & Power Company, Iowa City; Clinton, Davenport & Muscatine Railway Company (interurban), Davenport; Peoples Power Company, Rock Island and Moline, Ill.; Tri-City Railway Company of Illinois, Rock Island, Ill.; Moline, Rock Island & Eastern Traction Company, Moline, Ill.; and the Moline-Rock Island Manufacturing Company, Moline, Ill. These companies are all units of the United Light & Railways Company, Chicago, Ill., Grand Rapids, Mich., and Davenport, Iowa. Mr. Denman has taken a wide interest in the larger phases of his life work and is interested in all topics of a national nature affecting the electrical engineering field During his service with the Detroit Edison Company he was non-resident lecturer at the University of Michigan. delivering regularly weekly lectures for one year on electric railways and the design of power houses and substations. During another year he was acting assistant professor of mechanical engineering, in charge of lecture courses for senior students. He is an associate member of the American Institute of Electrical Engineering, a member of the American Gas Institute, and of the American Society of Mechanical Engineers. He has also taken an interest in present day patriotic questions and during the second Liberty Loan campaign was chairman of the Liberty Loan Central Committee of the Federal Reserve District Number Seven, of the committee for Eastern Iowa and also of the Davenport Local Committee. At the present time he is chairman of the Davenport Federal Fuel Committee.

D. J. Angus, who recently purchased an interest in, and associated himself with the Esterline Company of Indianapolis, Ind., as treasurer, takes the responsibility of the engineering department and of the design and development of new lines of instruments and apparatus. Prior to his acquiring an interest in the Esterline Company, Mr. Angus has been associated with J. W. Esterline in a large consulting engineering business which has been developed in the middle west. His association with the manufacturing company brings into that organization a man fittingly qualified by native ability, training and experience in both the engineering and business fields to assist in carrying out the enlarged program on which the Esterline Company has entered. Mr. Angus began his career as an engineer in the construction department of the Milwaukee Electric Railway & Light Company, later handling electric construction for the Wisconsin Telephone Company and also the Semet Solvay

D. J. Angus.

Process Company of Milwaukee. He spent the years 1906 and 1907 in special work and investigation at the University of Wisconsin, and for several years following was identified with some of the large electrical developments in the states of Michigan and Wisconsin. In 1909 Mr. Angus again took up the study of special electrical subjects, this time at the engineering department of the Michigan Agriculture College. In 1910 he became associated with Mr. Esterline in a consulting engineer practice, embracing the design, constructions and operation of power and industrial plants, and the design and development of new equipment and processes. This business has recently been incorporated in the Esterline & Angus Engineering Company, of which Mr. Angus is president. Although yet a comparatively young man, Mr. Angus has taken part in some of the pioneering work in the development of the industry. In 1909 Mr. Angus did original work in the testing of transmission-line insulators with high-frequency currents, and designed and built commercial apparatus embodying their application of this method of testing. Mr. Angus was one of the early advocates of charging for demand on a measured kilovolt-ampere basis, and as early as 1911 made a commercially successful application of this system of charging. A notable piece of design work was the design by Mr. Angus of the world's largest electric meter for the Mississippi River Power Company at Keokuk, Ia.

Leonard S. Cairns, assistant general manager of the Manila Electric Railroad & Light Company, Manila, P. I., has been appointed general manager of the Eastern Pennsylvania Railways Company, Pottsville, Pa., by The J. G. White Management Corporation, New York City, the operating managers of both companies. Mr. Cairns has arrived in the United States and has assumed the duties of his new position. He succeeds L. H. Palmer, who lately became Assistant to the President of the United Railways & Electric Company, Baltimore, Md., as recently announced in these columns. Mr. Cairns, upon leaving high school, entered the employ of the Twin City Rapid Transit Company, Minneapolis, Minn., and, after several promotions, was made general superintendent of that company. In 1912 he was employed by The J. G. White Management Corporation to fill the position of assistant general manager of the Manila Electric Railroad & Light Company.

## Obituary.

William J. Walsh, cashier of the Interboro Railway Company, 165 Broadway, New York, died November 24 at his home, 51 Clifton avenue, Jersey City, N. J.

Louis M. Winters, head of the firm of L. M. Winters & Company, New York, manufacturers of electrical equipment and machinery, died December 8, aged 73 years.

James McElroy, for a number of years engineer at the municipal power plant at Orange, N. J., died December 8, at his home, 230 Valley Street, Orange. He is survived by his widow and three children.

E. R. Cabble, a stockholder in the William Cable Excelsior Wire Manufacturing Companv. Brooklyn, N. Y., and brother to the president of the company, died December 12, at his home, 217 Hancock Street, Brooklyn, aged 62 years.

William Hyatt Harrington, widely known for research work for scientific societies of New York, died November 27 at his home, 1099 Mary street, Elizabeth, N. J. Mr. Harrington was a member of the New York Charity Organization, National Geographic Society, New York State Historical Association, American Museum of Natural History, Metropolitan Museum of Art, and the Historical Society of New York. He is survived by his widow and four children.

Charles J. Klein, of Milwaukee, Wis., designing engineer for the Cutler-Hammer Manufacturing Company, and intimate friend of Thomas A. Edison, was stricken with apoplexy in his home, 910 Wells Street, that city, Sunday evening, December 16, and passed away shortly thereafter. Mr. Klein, who was 55 years old, was born in New York City and went to Milwaukee in 1908, having left the Cutler-Hammer company in New York City to join its forces at Milwaukee. He was prominent as an electrical inventor, having been associated with Edison and Charles P. Steinmetz, Schenectady, N. Y. He was a member of the Sons of Jove. Besides his son, Henry Klein, of Yonkers, N. Y., he leaves a sister, Elizabeth C. Klein, of New York City.

# Current News

## *Weekly Record of Construction Activities—Record of Electrical Patents Issued December 4*

### EASTERN STATES.

SPRINGFIELD, VT.—Colonial Power & Light Company is making rapid progress in extension of its transmission line from Claremont to Windsor. The plans of the company provide that the line, which has heretofore been tied in with the Claremont-Cavendish line five miles from Claremont, will be brought directly into the Claremont substation. This improvement will make for better service on the Claremont-Cavendish line, and result in greater efficiency in serving the National Acme Company, which uses about 322,000 kilowatt-hours per month.

NEW BEDFORD, MASS.—J. S. Rhodes Company, 128 Front street, has awarded a contract for the construction of a one-story power house addition, about 25x 40 feet, to cost $10,000.

NEW LONDON, CONN.—United States Government, Bureau of Yards & Docks, has awarded a contract for the construction of its proposed two-story power house and machine shop, about 95x 250 feet, at the local navy yards. The structure is estimated to cost $200,000. Evatt Construction Company, 161 Devonshire street, Boston, Mass., is the contractor.

BUFFALO, N. Y.—H. I. Sackett Electric Company, Pearl street, will remove its works to a new plant on Court street.

BUFFALO, N. Y.—Hydro-Electric Association is negotiating with the City Council for assistance in revising the treaty with Canada to provide for more power at Niagara Falls. The association is also urging the immediate construction of a publicly-owned power plant at that point.

BUFFALO, N. Y.—New York Central Railroad, Grand Central Terminal, New York, has awarded a contract to the Eastern Concrete Steel Company, Morgan Building, Buffalo, for the erection of a one-story power house, about 60x65 feet, at 143 Curtiss street, to cost $30,000. The company has also awarded a contract for the construction of a two-story signal tower at the same location.

NEW YORK, N. Y.—Artificial Daylighting Company, 461 Eighth avenue, has filed notice of an increase in its capitalization from $50,000 to $500,000, to provide for expansion.

NEW YORK, N. Y.—Joseph Stern & Son, 618 West Fortieth street, have awarded a contract to E. W. Broderick, 110 West Fortieth street, for the erection of a two-story addition to its power plant, about 24x47 feet.

ROCHESTER, N. Y.—George Keith, 155 Exchange street, has awarded a contract for the construction of a one-story power house addition to his plant, about 25x50 feet, to cost $10,000. A. Friederich & Sons Company, 710 Lake avenue, Rochester, is the contractor.

ASBURY PARK, N. J.—Wrightstown Utilities Corporation has incorporated with a capital of $25,000, to manufacture gas, electricity, etc. The incorporators are A. F. Cottrell, J. P. Watson and J. C. English, all of Asbury Park.

BLOOMFIELD, N. J.—Power Specialty Company, 111 Broadway, New York, manufacturer of heaters, etc., has filed plans for the construction of a local plant on Locust avenue. The structure is estimated to cost $31,000.

HIGHTSTOWN, N. J.—Grover Brothers, operating a hay press on Broad street, are planning for the immediate installation of an electric plant.

HOPEWELL, N. J.—Borough Council is planning for immediate improvements in its electric street lighting system to include installation of larger candlepower units.

JERSEY CITY, N. J.—Until December 27, the Trustees of the Free Public Library, Jersey avenue and Montgomery street, will receive bids for the installation of lighting fixtures in the new library building now in course of construction on Zabriskie street. E. W. Miller, secretary.

JERSEY CITY, N. J.—Swift & Company, 154 Ninth street, have had plans prepared for the erection of a one-story addition, about 50x50 feet, to its local power house.

MORRISTOWN, N. J.—Board of Aldermen has awarded a contract to the Morris & Somerset Electric Company, Morristown, for supplying service for street lighting purposes for a period of five years.

NEWARK, N. J.—N. Dickinson Company, 367 High street, has been organized to engage in the manufacture of lighting specialties. Neville S. Dickinson heads the company.

NEWARK, N. J.—Alcohol Products Company, Blanchard street, has awarded a contract to Frederick Kilgus, Inc., 13 South Sixth street, Newark, for the construction of a one-story power house at its plant.

ORANGE, N. J.—Radium Luminous Material Corporation, 166 Alden street, has taken out a building permit for the construction of an addition to its plant to provide for increased capacity.

PERTH AMBOY, N. J.—Board of Aldermen has approved an appropriation of $25,000 for street lighting in 1918. It is also planned to make improvements and extensions in the street-lighting system.

TRENTON, N. J.—Horn & Brannen Manufacturing Company has incorporated with a capital of $60,000, to engage in a general electrical supply business. The incorporators are Herman Horn, Henry Donohue and Fred Pfeffer, all of Philadelphia, Pa.

COALDALE, PA.—Panther Creek Valley Hospital is having plans prepared for the construction of a one-story power house to cost about $8000. Lewis Stockton, 35 West Thirty-ninth street, New York, is the architect.

EASTON, PA.—Pennsylvania Utilities Company is making rapid progress in the installation of two new boilers in its Dock street power plant. The boilers are of 400 and 1000 horsepower.

EQUITY, PA.—Court of Common Pleas of Cambria County has issued notice for the sale of the Dale Light, Heat & Power Company, including property and franchise.

ERIE, PA.—American Brake Shoe & Foundry Company, General Electric Company and the Erie Forge Company are contemplating the construction of three big housing projects for the accommodation of their thousands of employees. Total estimated cost of construction is $6,000,000.

HALIFAX, PA.—Borough Council is planning for the immediate extension and improvement of its street-lighting system, to include the installation of new lights in Second street, from Strawberry to Armstrong street.

HARRISBURG, PA.—An ordinance has been introduced in the City Council providing for the consolidation of the city lighting, fire and police alarm bureaus into one department to be known as the City Electrical Bureau in charge of the city electrician.

HARRISBURG, PA.—City Council is planning for extensions in its underground system for the police and fire alarm departments, from Liberty to Cowden street. City Electrician Clark E. Diehl will make plans and estimate as to the cost of this improvement.

LANCASTER, PA.—Conestoga Transmission Company has filed notice with the Public Service Commission of a stock issue for $70,000 to provide for improvements, etc.

LANCASTER, PA.—Edison Electric Company has filed notice of a stock issue to the amount of $50,000 for extensions, improvements, etc.

LANCASTER, PA.—Lancaster County Railway & Light Company has filed notice of an increase in its capitalization from $2,500,000 to $3,750,000 to provide for extensions, improvements, etc.

LANCASTER, PA.—Lancaster County Railway & Light Company has acquired the Lancaster Electric Light, Heat & Power Company. The Lancaster County company controls the stock of all the utilities companies of the county, the principal ones being the Edison Electric Company, Conestoga Traction Company, Lancaster Gas Light and Fuel Company, and the Columbia Gas Light & Fuel Company.

MARCUS HOOK, PA.—Headley Good Roads Company, 301 South Thirtieth street, Philadelphia, has awarded a contract for the construction of a one-story power house, which in connection with a shop building, will cost $75,000.

PHILADELPHIA, PA.—Philadelphia & Reading Railway Company has awarded a contract to William Steele & Sons Company, Philadelphia, for the erection of a one-story power house, about 155x 215 feet, at its Erie avenue yards.

PHILADELPHIA, PA.—Department of Public Health & Charities has awarded a contract to the Standard Construction Company, 1713 Sansom street, Philadelphia, for the erection of a one-story power house at Thirty-fourth and Pine streets, to cost about $200,000. Dr. Wilmer Krusen, director.

PHILADELPHIA, PA.—United States Emergency Fleet Corporation, Finance Building, has awarded a contract to F. T. Ley & Company, Philadelphia, for the construction of a power house at North Bristol to cost $25,000.

PHILADELPHIA, PA. — Wallace & Company has filed plans for the construction of a one-story brick power house, about 30x95 feet, at Eighty-first street and Island road, to cost $10,000. Contract for the structure has been awarded to Henry E. Baton, 1713 Sansom street, Philadelphia.

PITTSBURGH, PA.—Pittsburgh-Beaver Light Company has filed notice with the Public Service Commisison of the issuance of stock for $666,000 and bonds for $565,000 for improvements, etc.

HIGHLANDTOWN, MD.—Crown Cork & Seal Company, Guilford avenue, has awarded a contract for the construction of a one-story power house, about 57x 117 feet, to cost $15,000. West Construction Company, American Building, Baltimore, is the contractor.

MT. SAVAGE, MD.—United Big Vein Coal Company is planning for the installation of electric mining machinery and the complete electrification of its plant.

LYNCHBURG, VA.—Retail Merchants' Association contemplates installing electric lighting plant. Address secretary of the association.

ANSTED, W. VA.—Mill Creek Colliery Company is having plans prepared for the construction of its power plant recently destroyed by fire with loss of $40,000.

DUNBAR, W. VA.—Dunbar Traction Company is planning for the immediate rebuilding of its power plant recently destroyed by fire with loss estimated at $75,000.

FAIRMONT, W. VA.—Greater Fairmont Investment Company plans to build a 10,000-kilowatt electric generating station.

ST. MARYS, W. VA.—St. Marys Light & Power Company is having plans prepared for the construction of a one-story electric-light plant, about 50x65 feet. R. H. Adair, 501½ Juliana street, Parkersburg, is the architect.

BURLINGTON, N. C.—Piedmont Railway & Electric Company has increased its capital to $1,000,000. It is said the company will change its name to the Piedmont Power & Light Company.

ATLANTA, GA.—Finance Committee will be asked to make an appropriation for the erection of an electric generating plant at the city incinerating station. City Electrician Turner has reported that a large amount of steam power goes to waste at this point every day. The generating plant will cost from $60,000 to $70,000 to put in operation. It is also possible that the city may use its own electricity for various departments later. The electricity to be generated at the proposed plant is at first to be used at the city pumping station.

## NORTH CENTRAL STATES.

CLEVELAND, OHIO. — Cleveland, through Lighting Commissioner Moritz, is in urgent need of about 1500 electric lighting globes to cost about $5 each, for ornamental lights in its many different parks. Order for these was placed in the East, but owing to delay in delivery, due to freight congestion, Commissioner Moritz has cancelled the order and is turning his attention to another section of the country for quick delivery. Address Lewis Bernstein or M. Moritz, City Hall, Cleveland.

CLEVELAND, OHIO.—New York Central Railway will erect a 40x79 foot power house here. Electrical equipment, generators, motors, etc., will be bought. Address W. Brahan, East Third and St. Clair streets.

CLEVELAND, OHIO.—Williams Storage Battery Company, 280 East 131st street, will construct an $8000 reinforced concrete shipping dock and a steel and concrete shed. The specifications include an electric crane and side tracks.

CABERY, ILL.—Bonds of $4500 have been voted for electric plants. Address Henry Raab.

CHICAGO, ILL.—Chicago Surface Company has completed plans for the construction of a group of four buildings, representing an expenditure of $500,000, to be constructed at Clark street and Schreiber avenue. Two large car barns, each 450 feet long, a large power house and a two-story office building will be built.

JOLIET, ILL.—Chicago & Joliet Electric Railway Company is contemplating the construction of two substations; one at Osgood and St. Louis streets and the other at Delwood Park. Total estimated cost is $50,000.

AMHERST, WIS.—B. E. Dwinnell Electric Light Company will extend electric line from Amherst to Amherst Junction.

GLIDDEN, WIS.—Northern Wood Products Company contemplates building an addition to its power plant, to cost $40,000. W. A. Thomas, president.

IOLA, WIS.—Iola Light, Power & Manufacturing Company will improve plant, changing from direct to alternating current, engines, generators, transformers, meters and some poles. J. C. Cadby, Washington Building, Madison, is consulting engineer.

JANESVILLE, WIS.—Janesville Electric Company will install a 150-horsepower water turbine. Address P. H. Korst, general manager, 31 West Milwaukee street.

KAUKAUNA, WIS.—Kaukauna Electric Light Company contemplates extending electric transmission lines to Fairview Heights. Address William B. Montgomery, manager.

RIDGEWAY, WIS.—At special election it was decided to have the Mineral Point Public Service Company build its lines from Dodgeville to Ridgeway. The line is to be completed in January.

SUPERIOR, WIS.—Globe Shipbuilding Company will build an addition to its plant and will install three electrically-operated traveling cranes.

DULUTH, MINN.—Duluth-Edison Electric Company has been granted permission to effect changes which will result in better lighting service in the western part of the city. The company was granted the privilege of extending its present three-phase, 2300-volt feeder line through New Duluth and past the pumping station of the water and light department. The city will change its motor operating the pump to conform with the alteration, because the present single-phase system is a pull on the line. The city and the company will divide the expense, but all apparatus will remain the property of the city.

### DATES AHEAD.

American Institute of Consulting Engineers, Inc. Annual meeting, January 14. Secretary, F. A. Molitor, 35 Nassau Street, New York City.

Electrical Contractors' Association of State of Missouri. Annual convention, January 19. Secretary, A. J. Burns, 318 West Tenth Street, Kansas City, Mo.

Minnesota Electrical Contractors' Association. Annual convention, Minneapolis, Minn., January 20. Secretary, G. M. Jones, 112 South Seventh Street, Minneapolis.

Northern White Cedar Association. Twenty-second annual meeting, Hotel Radisson, Minneapolis, Minn., January 22-23, 1918. Secretary, N. E. Boucher, 743 Lumber Exchange, Minneapolis.

Western Association of Electrical Inspectors. Annual meeting, Memphis, Tenn., January 29-30-31. Secretary, W. S. Boyd, 175 West Jackson Boulevard, Chicago, Ill.

Illinois Electrical Contractors' Association. Semi-annual convention, Chicago, February, 1918. Secretary-Treasurer, L. B. Van Nuys, 238 South Jefferson Avenue, Peoria, Ill.

Vermont Electrical Association. Annual meeting, February, 1918. Secretary-Treasurer, C. H. West, Rutland, Vt.

National Association of Electrical Inspectors. Annual convention, New York, March, 1918. Secretary-Treasurer, William L. Smith, Concord, Mass.

Wisconsin Electrical Association. Annual meeting, March, 1918. Secretary, George Allison, 1410 First National Bank Building, Milwaukee, Wis.

Southwestern Society of Engineers. Annual meeting, April, 1918. Secretary, C. E. Barglebaugh, 703 First National Bank Building, El Paso, Tex.

Kentucky Association of Electrical Contractors. Annual meeting, May, 1918, Louisville, Ky. Secretary, F. F. Valinoti.

Texas State Association of Electrical Contractors. Annual meeting, Galveston, Tex., June 15, 1918. Secretary, H. S. Ashley, Fort Worth, Tex.

MARSHALLTOWN, IA.—City council is making plans to replace the equipment of its electric lighting plant with new machinery of increased capacity. In making plans for a new lighting system the city council expects to get machinery of sufficient capacity so that it will be able not only to light all the intersections that are now lighted, but also to take over the electroliers that are lighted by the Iowa Railway & Light Company.

BAYARD, NEB.—Bonds issue of $4500 for installing ornamental lighting system carried.

OCONTO, NEB.—Electric light franchise has been granted to Dr. J. L. Paine. The plant has been ordered and in a short time the village will be well lighted.

GROTON, S. D.—Groton Light, Heat & Power Company will build a transmission line from Ashton to Conde and from Conde to Verdon and Ferney, thence to Groton and then to Andover.

PRESHO, S. D.—Franchise has been granted to O. E. Helgerson for electric lighting system.

## SOUTH CENTRAL STATES.

MURRAY, KY.—City will take over the Mayfield Water & Light Company, of Mayfield, March 31, under a court decision, which fixed the price of the property at $272,000. The city had placed a valuation of $200,000 on the property, which the company held was worth $325,000. J. S. Stiltz, of Fulton, Ky., has been engaged as manager of the new municipal plants.

SHEPHERDSVILLE, KY. — Bullitt County Electric Light Company has incorporated with a capital of $900. The incorporators are S. W. Bates, C. L. Croan and S. H. Ridgway.

FOLEY, ALA.—Election will be held regarding issuance of $3000 of municipal bonds for establishing or purchasing electric light plant. Address Charles A. Boller, mayor.

MOUNTAIN HOME, ARK.—A company has been organized to develop the water power on North Fork for the purpose of erecting large smelters to work up large deposits of zinc and iron ores in north Arkansas and south Missouri. E. N. Sanderson, of New York, president of the Federal Light & Traction Company, of Springfield, Mo., and other well known capitalists made a trip of inspection to different points on the North Fork recently, in search of desirable sites to erect the dams. In order to secure the power necessary to operate the kind of smelters contemplated in this section at least 3000 horsepower must be generated. It will be necessary to erect more than one dam and generating plant.

STUTTGART, ARK.—S. R. Morgan & Company, of Little Rock, have been granted a 50-year franchise to operate an electric light and power plant here. The franchise calls for the commencement of construction work in 60 days and the completion and operation of the plant, which will represent an investment of $100,000, within ten months.

DALLAS, TEX.—By unanimous vote the city commission approved two street railway recommendations of Public Utilities Supervisor Baker. Many of the streets will have double tracking.

FORT WORTH, TEX.—Fort Worth Power & Light Company has increased its capital stock from $3,860,000 to $4,360,000. The company will install a new 23,000-horsepower steam turbine generator and other equipment in its power plant.

MARSHALL, TEX.—East Texas Utilities Company has incorporated with a capital of $300,000. J. M. Dickie, J. E. Meadows and F. A. Matthes are the incorporators. The new company has bought the property of the Jefferson Ice & Light Company, of the Marshall Electric Company and the Longview Ice & Light Company.

NACOGDOCHES, TEX.—City council will install a large amount of new machinery and equipment in the electric light plant with a view of doubling its capacity.

## WESTERN STATES.

CASPER, WYO.—The Kimball or Wyoming Building will be raised two stories and an electric elevator installed and other improvements made, according to plans announced by A. H. Stewart and W. S. Kimball, joint owners of the block.

YUMA, ARIZ.—Southern Sierras Power Company has abandoned temporarily its project of extending its power transmission line from Yuma through Gila bend to Ajo on account of the difficulty in having orders for equipment filled. The special purpose of the proposed construction was to afford power for operating irrigation pumping plants and mining machinery.

SALT LAKE CITY, UTAH.—The battery charging station of the Capitol Electric Company, 21 West First South street, was visited by fire recently and damage, which is covered by insurance, is estimated to amount to $2000.

EVERETT, WASH.—The city has entered into arrangements with Burns & McDonnell of Kansas City, Mo., to make a survey and submit reports on a power project to furnish the city with a municipal power plant. The question is to be submitted to the voters next year and in case it is decided to establish the system by bond issues, Burns & McDonnell are to furnish the directing engineer for the work.

PROSSER, WASH.—City council voted to accept the lighting contract tendered by the Pacific Power & Light Company. The contract is to endure for ten years and provides for additional lights and the changing of the system from the arc to the incandescent type of lights.

RENTON, WASH.—Chicago, Milwaukee & Puget Sound Railway Company has had plans prepared for construction of a substation here together with three bungalows. This is to be one of the units in the work of electrifying the road over the Cascades, a distance of 116 miles.

TACOMA, WASH.—City council has voted to appropriate $30,000 from the reserve fund of the light department for the purchase of cars for the municipal tideflats car line. Ten new cars will be purchased, four motor cars and six trailers. The motors will cost $5000 each and the trailers $3200 each.

TACOMA, WASH.—Commissioner of light and water, H. F. Gronen, is to present plans and specifications for the people to vote upon in the spring in the

matter of purchasing additional power site and plant.

TACOMA, WASH.—Tacoma Railway & Power Company is to extend its lines into Camp Lewis, a distance of about five miles.

WHITE SALMON, WASH.—Pacific Power & Light Company is to construct a large sub-power electric station for the purpose of serving the city.

## PROPOSALS

CONDUIT AND WIRING SYSTEM.—Sealed proposals will be opened in the U. S. Custom House and post office, Racine, Wis., January 7 for conduit and wiring system, lighting fixtures, etc. Copies of drawings and specifications may be had at the office of the custodian in the discretion of the supervising architect, James A. Wetmore, Washington, D. C.

DISTRIBUTING SYSTEM. — Sealed proposals will be received at Fremont, N. C., in connection with construction of 22,000-volt steel wire power transmission line, about 10 miles long, substation, arc lights and distributing systems. Plans and specifications are on file at the office of the town clerk.

ELECTRICAL MATERIAL.—Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids on the following material, for delivery at Puget Sound, Wash., schedule No. 1638: 1000 feet rubber-insulated interior communication cable; 1000 feet lighting and power wire; 10,000 feet single-conductor lighting and power wire; 500 feet two-conductor lighting and power wire.

LIGHTING FIXTURES. — Supervising Architect, James A. Wetmore, Treasury Department, Washington, D. C., will receive sealed bids until December 28 for furnishing and installing lighting fixtures in the United States post offices at Beaver Dam, Wis.; Bemidji, Minn.; Cedar Falls, Ia.; Charleston, Ill.; Commerce, Tex.; Coshocton, Ohio; Fordyce, Ark.; Girard, Kans.; Laconia, N. H.; Lakeland, Fla.; Lancaster, Ky.; Moultrie, Ga.; the United States post office and custom house extension at Nashville, Tenn., and the United States custom house and appraiser's stores at Wilmington, N. C., in accordance with drawings and specifications, copies of which may be had at the Architect's office. Proposals are desired only from those qualified to produce work of the highest grade, both artistically and mechanically.

## INCORPORATIONS

CHICAGO, ILL.—Electrical Engineering Company. Capital, $5000. Incorporators: Eben F. Runyan, J. Brandt and Franklin Raber.

OZARK, MO.—Finley Light Company. Capital, $10,000. To operate a local plant. Incorporators: George T. Breazeale, and D. W. Bingham, Ozark.

NEW YORK, N. Y.—Steinmetz Electric Vehicle Development Company. Capital, $25,000. Incorporators: I. B. Ripin, J. Levy, and H. Marx, 115 Broadway.

## NEW PUBLICATIONS

TELEPHONE PIONEERS OF AMERICA.—The proceedings of the sixth annual convention of the Telephone Pioneers of America, held October 27-28, 1916, at Atlanta, Ga., is now published in book form. Aside from containing the full proceedings of the Atlanta meeting, a copy of the constitution and by-laws, alphabetical roster of telephone pioneers of America, portraits of prominent officers, including its distinguished president, Theodore N. Vail, and many other interesting facts are given.

## FOREIGN TRADE OPPORTUNTIES

A firm in New South Wales wishes to represent American manufacturers and exporters of hardware and electrical appliances. References required. Address Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Opportunity No. 25705.

A company in Italy desires to secure an agency for the sale of electrical apparatus, telephones, dynamos, electric motors, lamps, accumulators, measuring instruments, safety appliances, etc. Cash or credit terms will be arranged to cover each transaction. Correspondonce may be in English. References desired. Opportunity No. 25726.

A man in Chile desires to buy small dynamos up to 110 volts and up to 50 amperes, electric wires, telephones and supplies, batteries, storage batteries, door bells, electric-light supplies and fixtures, auto lamps, etc., and all supplies for electrical installations. Quotations should be made f. o. b. American port. Payment will be made by cash with order. Goods should be securely packed to withstand rough handling. Correspondence should be in Spanish. References required. Opportunity No. 25694.

A firm in Italy desires to buy all porcelain and general insulating materials and accessories for electrical insulations and thermometers for medical, chemical, bath, radiator and household use. These thermometers must be centigrade and must have figures and degrees plainly printed on the porcelain back and not on the glass. A sample of the kind of thermometers as well as a sample of an electric switch may be examined at the Bureau or its district offices. Payment will be made against shipping documents through local banks. Correspondence should be in French or Italian. Opportunity No. 25803, file No. 92105.

# Electrical Patents Issued December 4, 1917

**Prepared by Albert Scheible, Patent Attorney, 79 West Monroe Street, Chicago, Ill.**

Prepared by Albert Scheible, Patent Attorney, 79 West Monroe Street, Chicago, Ill.

1,248,439. **Braking System.** A. F. Batchelder, assignor to General Electric Co., Schenectady, N. Y. Uses a dynamo as a braking generator for railway car and controls it by connections to the air-brake valves.

1,248,443. **Method of Removing and Replacing Storage-Battery Connectors.** H. S. Bowler, Gloversville, N. Y.

1,248,444. **Regulating Device.** P. H. Brace, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

1,248,448. **Tube Clamp.** J. M. Brown, assignor to Westinghouse Electric and Mfg. Co. For switchboard supports.

1,248,460. **Electrical System for Automobiles.** F. Conrad, assignor to Westinghouse Electric & Mfg. Co.

1,248,461. **Electromagnetic Device.** Gustavus C. Crawford, assignor to Western Electric Co., New York, N. Y. A pole changer.

1,248,467. **Automatic Pumping System.** E. E. Eby, assignor to Westinghouse Electric & Mfg. Co.

1,248,474. **Alternating-Current Motor.** V. A. Flynn, assignor to Wagner Electric Mfg. Co., St. Louis, Mo. Includes means for changing the angle of displacement between two circuits in which current is induced (See cut.)

1,248,479. **Automatic Telephone-Exchange System.** C. L. Goodrum, assignor to Western Electric Co.

1,248,484. **System of Distribution.** A. J. Hall, assignor to Westinghouse Electric & Mfg. Co.

1,248,495. **Electrode for Slip-Regulators.** G. W. Huey, assignor to Westinghouse Electric Mfg. Co.

1,248,497. **Vapor Electric Apparatus.** R. P. Jackson, assignor to Westinghouse Electric & Mfg. Co. A vacuum rectifier.

1,248,498. **Suspension Device for Insulators.** R. P. Jackson and W. Schaake, assignors to Westinghouse Electric & Mfg. Co.

1,248,502. **Electric-Light Fixture.** W. D. Kyle, Milwaukee, Wis. Street-lamp suspension.

1,248,505. **Operating Mechanism for Cutouts.** E. P. Larsh, assignor to Burnett-Larsh Mfg. Co., Dayton, O.

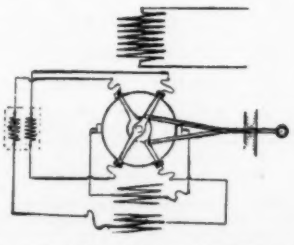
1,248,508. **Electric Switch.** P. L. Leisse, Billancourt, France.

1,248,511. **Ammeter.** P. M. Lincoln, Pittsburgh, Pa. (See cut.)

1,248,512. **Brake Apparatus.** D. L. Lindquist and D. C. Larson, assignors to Otis Elevator Co., Jersey City, N. J. Includes magnetic means for releasing a brake.

1,248,515. **Telephone-Exchange System.** A. E. Lundell, assignor to Western Electric Co.

1,248,519. **Starting Switch.** J. N. Mahoney and G. L. Christman, assignors to Westinghouse Electric & Mfg. Co.



No. 1,248,474.—Alternating-Current Motor.

1,248,527. **Electrical Measuring Instrument.** W. G. Mylius and B. G. La Bar, assignors to Westinghouse Electric & Mfg. Co.

1,248,528. **Clamp-Type Terminal.** H. C. Nagel, assignor to Westinghouse Electric & Mfg. Co.

1,248,530. **Coil-Winding Machine.** E. R. Norris, assignor to Westinghouse Electric & Mfg. Co.

1,248,531. **Balancing Means for Phase-Converting Systems.** S. G. Nottage, assignor to Westinghouse Electric & Mfg. Co.

1,248,544. **Method of Making Electric-Switch Jaws.** K. C. Randall, assignor to Westinghouse Electric & Mfg. Co.

1,248,549. **Engine-Starter.** J. H. Richards, assignor to Splitdorf Electrical Co., Newark, N. J. Includes an electric motor with two relatively movable shafts.

1,248,559. **High-Tension Suspension Insulator.** E. O. Sessions, Chicago, Ill.

1,248,566. **Electrical Device.** F. M. Slough, assignor to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. For telephone systems.

1,248,568. **Single-Phase Power-Factor-Measuring Device.** B. H. Smith, assignor to Westinghouse Electric & Mfg. Co.

1,248,569. **Electrical Appliance for Conduit Outlet Boxes.** F. C. Smith, assignor to Crouse-Hinds Co., Syracuse, N. Y.

1,248,575. **Snap Switch for Sadirons and the Like.** S. Trood, assignor to Westinghouse Electric & Mfg. Co.

1,248,603. **Panelboard Construction.** F. L. Benson, assignor to Trumbull Electric Mfg. Co., Plainville, Conn.

1,248,612. **Distributer Arm.** J. F. Cavanagh, assignor to Connecticut Telephone & Electric Co., Meriden, Conn.

1,248,621. **Metal Alloy.** H. S. Cooper.

assignor to Electro Metals Products Co., Cleveland. A substitute for platinum contacts.

**1,248,624. Electric Regulation.** J. L. Creveling, assignor to Safety Car Heating & Lighting Co., New York, N. Y.

**1,248,631. Air Purifier and Humidifier.** M. Dickerson, Newark, N. J. Includes a water wheel rotated by the blast from an electric fan.

**1,248,632. Polyphase Electric Furnace.** J. L. Dixon, Detroit, Mich.

**1,248,637. Electric Log.** L. C. Eddy, Buffalo, N. Y. A heater simulating a burning log.

**1,248,641. Signaling Device for Vehicles.** J. H. Ferguson, assignor to All-See Traffic Signal Co., Rochester, N. Y.

**1,248,654. Lamp.** E. A. Hawthorne, Bridgeport, Conn. A lamp mounting for vehicle headlights.

**1,248,657. Carrier-Dispatch Power-Control System.** C. P. Hidden, assignor to The Lamson Co., Boston, Mass.

**1,248,658. Single-Tube Pneumatic-Dispatch System.** C. P. Hidden, assignor to The Lamson Co.

**1,248,663. Speed-Controlling Mechanism for Block-Signal Systems.** M. R. Julian, M. H. Hovey and T. E. Clark, assignors to Julian-Beggs Signal Co., Terre Haute, Ind.

**1,248,688. Portable Electric Lamp.** E. Ludescher, Chicago, Ill.

**1,248,699. Terminal Box.** C. C. Oberly, Chicago, Ill. Assignor to The Pullman Co., Chicago, Ill. For car-lighting systems.

**1,248,719. Signal Lamp.** G. E. Roedding and E. B. Roedding, Detroit, Mich.

**1,248,728. Trolley Hanger for Grade-Crossing Bridges.** J. Scott, Cleveland, O.

**1,248,738. Engine-Testing Device.** W. E. Somerville, Coal City, Ill. A combined mechanical and electrical testing device for gasoline engines.

**1,248,741. Safety Device for Electrical Circuits.** M. H. Spielman, New York, N. Y.

**1,248,749. Electric Signal System.** N. H. Suren, assignor to Gamewell Fire Alarm Telegraph Co., New York, N. Y.

**1,248,766. Dipping Mechanism.** W. Whigham, Pittsburgh, Pa. For use in coloring lamp bulbs.

**1,248,768. Storage Battery.** T. A. Willard, assignor to Willard Storage Battery Co., Cleveland, O.

**1,248,782. Calling Mechanism for Party-Line Exchanges.** C. A. Anderson, Chicago, Ill.

**1,248,787. Electrical Switch.** F. J. Backscheider, Cincinnati, O.

**1,248,800. Electrically Heated Press for Clayware.** S. G. Brinkman, Fords, N. J.

**1,248,812. Electrically Uniting Metals.** F. A. Costello, assignor to H. F. Lyman, Boston, Mass. An electrical soldering apparatus.

**1,248,813. Electric Welding and Soldering.** F. A. Costello, assignor to H. F. Lyman.

**1,248,829. Condenser-Terminal and Method of Forming Same.** B. Dick, assignor to Wagner Electric Mfg. Co., St. Louis, Mo.

**1,248,834. Automatic Trunking System.** E. D. Fales, assignor to Automatic Electric Co., Chicago, Ill. For telephone systems.

**1,248,840. Ignition System.** V. Alfred Fynn, assignor to Wagner Electric Mfg. Co.

**1,248,848. Self-Starting Device for Storage-Battery Plants.** J. H. Gugler, Milwaukee.

**1,248,849. Lighting Fixture.** E. F. Guth, St. Louis, Mo., assignor to St. Louis Brass Mfg. Co.

**1,248,850. Automatic Electric-Light Buoy.** H. Hartman, New York, N. Y., assignor to J. Erdoes, New York, N. Y.

**1,248,868. Semi-Automatic Telephone-Exchange System.** M. L. Johnson, assignor to Automatic Electric Co.

**1,248,870. Engine-Starter.** J. J. Kane, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis.

**1,248,877. Spark-Plug Tester.** W. D. Luce, Haverhill, Mass.

**1,248,894. Electric Thermostat.** C. L. Norwood, Philadelphia, Pa.

**1,248,924. Commutator-Section of Cast Alloy.** H. K. Sandell. An alloy of 95 per cent copper and 5 per cent nickel.

**1,248,927. Electric Welding Apparatus.** G. H. Schkommodau, Cincinnati, O.

**1,248,930. Illuminating Device for Vehicles.** A. C. Schulz, assignor to Locomobile Co. of America, Bridgeport, Conn. For lighting the steps and interior of an automobile.

**1,248,934. Pocket Flashlight.** E. W. Seymour, New Nork, N. Y.

**1,248,942. Electric Detector-Circuit.** F. J. Sprague, Sharon, Conn., assignor to Sprague Safety Control & Signal Corporation.

**1,248,968. Automobile-Lighting Apparatus.** F. E. Wilson, London, England.

**1,248,979. Telephone-Exchange System.** F. V. Young, Newark, N. J., assignor to Western Electric Co.

**1,248,978. Attachment Plug for Connecting Dry Cells to Incandescent-Lamp Holders.** C. E. Youmans, Yonkers, N. Y.

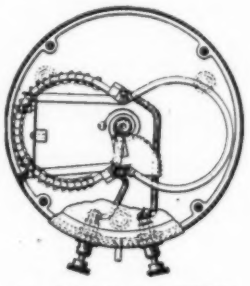
**1,248,998. Microphonic Attachment for Telephone Transmitters.** W. C. Bellows, assignor to Pelouze Mfg. Co., Chicago, Ill.

**1,249,027. Switch.** J. F. Cavanagh, assignor to Connecticut Telephone & Electric Co., Meriden, Conn. Includes a rotatably supported push button.

**1,249,032. Method of Metering Telephone-Traffic.** E. E. Clement, Washington, D. C.

**1,249,036. Telephone System.** H. D. Currier, assignor to Kellogg Switchboard & Supply Co., Chicago.

**1,249,041. Carbon and Method of Producing the Same.** R. A. Demme, New York, N. Y.



No. 1,248,511.—Ammeter.

**1,249,043. Limit-Switch Mechanism.** W. N. Dickinson, Brooklyn, N. Y., assignor to Standard Plunger Elevator Co.

**1,249,062. Anchor.** J. E. Garvin, Albany, N. Y. For guy rods.

**1,249,063. Magneto Lamp.** P. E. Gilling, assignor to Splitdorf Electrical Co., Newark, N. J.

**1,249,065. Pull-Switch Indicator.** G. W. Goodridge, assignor to Bryant Electric Co., Bridgeport, Conn.

**1,249,068. Push Buttons.** J. Gramm, New York, N. Y.

**1,249,083. Telegraphy.** E. S. Heurtley, Oxford, England.

**1,249,110. Electrical Operating Means for Doors.** J. R. Kaiserman, Livingston, Mont.

**1,249,117. Pull-Chain Switch.** C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis.

**1,249,133. Projector.** S. L. Lebby, Charleston, S. C.

**1,249,135. Electrical System.** L. J. Le Pontois, assignor to The Teagle Co., Cleveland, O. Combination high and low tension generator for lighting and ignition circuits.

**1,249,145. Machine-Switching Telephone-Exchange System.** A. E. Lundell, assignor to Western Electric Co.

**1,249,146. Telephone-Exchange System.** A. E. Lundell, assignor to Western Electric Co.

**1,249,152. Magneto Construction.** S. C. McKeown, assignor to Splitdorf Electrical Co., Newark, N. J.

**1,249,154 and 1,249,155. Electric Switches.** J. L. McQuarrie, assignor to Western Electric Co.

**1,249,155. Electric Switch.** J. L. McQuarrie, assignor to Western Electric Co.

**1,249,157. Contact-Interrupter for the Electromagnetic Production of Musical Sounds.** A. H. Maitre and V. H. G. Martin, Rouen, France.

**1,249,159. Two-Wire Automatic-Telephone System.** T. G. Martin, assignor to Automatic Electric Co., Chicago, Ill.

**1,249,162. Signaling System.** C. F. Mead, Cleveland, O. For alarm systems.

**1,249,223. Battery-Changer.** A. P. Smith, Portland, Me.

**1,249,245. Electric Switch.** J. W. Teare, Klowa, Tex.

**1,249,247. Attachment Plug.** G. B. Thomas, Bridgeport, Conn., assignor to Bryant Electric Co., Bridgeport, Conn.

**1,249,268. Storage Battery.** T. A. Willard, assignor to Willard Storage Battery Co.

**1,249,285. Electric Water-Heater.** M. H. Shoenberg, assignor to Majestic Electric Development Co., San Francisco, Cal.

**1,249,286. Electroplating Apparatus.** E. B. Stone, New Britain, Conn., assignor to American Hardware Corporation, New Britain, Conn.

**1,249,288. Lighting Attachment for Sound-Reproducing Machines.** G. E. Bernecker, assignor to Record-Lite Co., Milwaukee, Wis.

## Reissues.

**14,401. Process of Making Terminals, and Terminals.** H. B. Andrews, assignor to H. B. Sherman Mfg. Co., Battle Creek, Mich.

**14,403. Recording Electric Meter.** A. Herz, assignor to Westinghouse Electric & Mfg. Co.

## Patents Expired.

The following United States electrical patents expired on December 18, 1917:

663,859. Receiver for Printing Telegraphs. J. Burry, New York, N. Y.

663,903. Telegraphic Instrument. H. T. Johnson, Jersey City, N. J.

663,926. Auxiliary Attachment for Signal Boxes. B. Oehmen, New York, N. Y.

663,929. System for Heating Conductors of the Second Class. C.D. Raab, Kaiserslautern, Germany.

663,937. Primary Battery. C. B. Schoenmehl, Waterbury, Conn.

663,938. Galvanic Battery. C. B. Schoenmehl, Waterbury, Conn.

663,951. System of Motor Control. A. H. Armstrong, Schenectady, N. Y.

663,981. Electric Lighting Appliance. A. Peters, Manitou, Colo.

663,995. Germ Destroyer for Telephone Mouthpiece. L. L. Lacey, Austin, Tex.

664,004. Electrical Piano. S. K. Reynolds, New York, N. Y.

664,006, 664,007 and 664,008. Galvanic Battery. C. B. Schoenmehl, Waterbury, Conn.

664,023. Electric Accumulator. P. Marino, Brussels, Belgium.

664,046. System of Non-interchangeable Contact Parts. R. Hundhausen, Wilmersdorf, Germany.

664,061. Electric Switch. C. W. Scott, Lynchburg, Va.

664,068. Automatic Stop Mechanism. C. F. Van Dyke, Atchison, Kans.

664,077. Operating Dynamo-electric Machines. W. L. R. Emmet, Schenectady, N. Y.

664,081. Electrical Heating Apparatus. C. Gohlin, New York, N. Y.

664,083. Clutch for Electric Arc Lamps. C. E. Harthan, Lynn, Mass.

664,086. Regulator for Electrically Actuated Air Compressors. E. M. Hewlett, Schenectady, N. Y.

664,087. Automatic Rheostat. E. M. Hewlett, Schenectady, N. Y.

664,092. Electricity Meter. W. M. Mordey and G. C. Fricker, London, England.

664,096. Electric-railway System. W. B. Potter, Schenectady, N. Y.

664,106. System of Electrical Distribution. C. P. Steinmetz, Schenectady, N. Y.

664,135. Electric Sweeper and Dust Gatherer. C. Dufour, Savannah, Ga.

664,144. Electrical Connection. W. Gerhardt, Hazelton, Pa.

664,163. Combined Automatic Gas-light Extinguisher and Electric Spark. G. H. Lippmann, Milwaukee, Wis.

664,176. Electric Insulator. E. Risler, Freiburg, Germany.

664,189. Electrical Switch Cap. G. B. Thomas, Hartford, Conn.

664,190. Alternating-current Electric Motor. E. Thomson, Swampscott, Mass.

664,191. Call-register or Service-meter Circuit for Switchboard Apparatus. G. K. Thompson, Malden, Mass.

664,195. Controller Switch. N. Vance, Chicago, Ill.

664,198. Secondary Battery. F. W. Wetherill, Philadelphia, Pa.

664,207. Railway Signaling Device. R. B. Benjamin, Chicago, Ill.

664,209. Electric Arc Lamp. J. A. Brennan, Worcester, Mass.

664,222. Cover or Shade for Incandescent Lamps. W. R. Krumwiede, Providence, R. I.

664,247. Dynamo-electric machine. J. B. Entz, Philadelphia, Pa.

664,265. Electric Meter. E. S. Halsey, Chicago, Ill.

664,301. Insulator. R. H. Sterling, Pittsfield, Mass.

664,308. Electrotherapeutic Spectacles. T. B. Zeller. Pittsburgh, Pa.

664,333. Electric Furnace. J. M. Morehead, Chicago, Ill.

664,334. Manufacture of Carbide of Calcium. J. M. Morehead, Chicago, Ill.

664,346. Telephone-call Register. W. H. Barker. Hartford, Conn.

664,348. Electric Clock. U. L. Collins, St. Louis, Mo.

664,362. Fire-alarm Telegraph Box. L. G. Woolley, Kenton, Ohio.

664,367. Electric-circuit Indicator. L. G. Woolley, Kenton, Ohio.

# Financial News

## UTILITY INTERESTS ACTIVE.

Owners of securities of the public utility companies may attempt to take matters in their own hands in the near future, according to gossip in circulation in eastern financial circles. This may first appear in the shape of a call to owners of the utility securities to organize into a great movement which will have as its prime object the "getting" of certain hard-headed public service commissions.

Their greatest weapon will be public education. In different ways, through the medium of publicity, the public will be put in touch with many of the problems which the companies have to face and their cure.

Such an organization is said to have been found necessary by prominent interests which are getting into a fighting attitude with regard to the "senseless antagonism" displayed by the various public service commissions of the country toward corporations over which they have jurisdiction with regard to price fixing.

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Trustees of the Chicago City and Connecting Railways have retired $250,000 of the company's bonds and paid off an additional $50,000 of floating debt. Even after these payments there was left a substantial amount for the surplus account.

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## GENERAL ELECTRIC PROFITS.

If the official estimates of the General Electric management are verified by the full returns, the company in its fiscal year ending December 31 will roll up the record profit of $27,000,000, a sum nearly $8,000,000 larger than in 1916, up to that time holding the record in volume of net earnings and for that matter in percentage of profits for the stock. In 1916 General Electric's fixed charges on its relatively small bonded debt of $12,047,000 were but $571,445. This year charges will be considerably larger. The company sold $15,000,000 three-year 6 per cent notes in July. The half year's interest on these and the interest and discount on the $10,000,000 additional 6 per cent notes sold at the end of November will add about $550,000 to charges this year.

On this basis total charges for 1917 may be approximated at $1,100,000. This sum deducted from the $27,000,000 of net profits after taxes of all sorts, including excess profit taxes, leaves a balance of $25,900,000 for the $101,512,500 stock that will be outstanding December 31. This is equivalent to 25.6 per cent, against 18.31 per cent in 1916. The new $10,000,000 stock will not be issued until after the 1918 year is under way.

Perhaps the most remarkable feature of the General Electric situation, and one which is least appreciated, is the big physical expansion which has been quietly progressing for two years. During 1916 and 1917 the company will have expended or started work on new plant facilities, which includes of course, land, buildings and machinery, involving a total of $36,000,000. In 1916 the actual expenditure was $8,828,254. This means that in 1917 the company has either expended or committed itself to the expenditure of $27,000,000 for new physical equipment with which to handle its record volume of business.

The growth of General Electric has been so great during recent years and the present magnitude of its gross and net are so much in excess of normal times that the following comparative figures make a remarkable exhibit:

| | Gross sales. | Net after taxes. | % on stock. | New construction. |
|---|---|---|---|---|
| 1917 | $192,000,000 | $27,000,000 | 25.6 | *$27,000,000 |
| 1916 | 134,242,290 | 18,589,528 | 18.3 | 8,828,254 |
| 1915 | 85,522,070 | 11,737,909 | 11.5 | 4,485,068 |
| 1914 | 90,467,691 | 11,287,826 | 11.1 | 6,006,956 |
| 1913 | 106,477,438 | 13,057,879 | 12.9 | 11,373,118 |
| 1912 | 89,182,186 | 12,578,736 | 16.2 | 6,068,969 |
| 1911 | 70,383,854 | 10,562,806 | 14.5 | 4,070,221 |
| 1910 | 71,478,558 | 10,855,692 | 16.7 | 5,846,531 |

*Includes actual expenditures and those which have been started. Only a part of expenditure has actually been made.

## COPPER.

Belief that no change will be made in the price of copper for several months at least, is gaining ground, says a New York dispatch. This seems to be especially true since the return of the copper men who were in conference with the government representatives last Friday. Some of the smaller companies made a request through representatives for a higher quotation by the government, but this was not well received, it is learned, and, although there was nothing definite at the meeting to base an opinion on, it is the belief that the 23½c price will be continued.

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### Goodyear Tire to Double Stock.

Stockholders of the Goodyear Tire & Rubber Company have been asked to approve an increase of $50,000,000 in the company's capital stock, half of the new stock to be 5 per cent cumulative preferred and half common. It is intended to offer for sale at this time only $15,000,000 preferred stock. If the increase is approved the company will have a total authorized capitalization of $100,000,000. The new preferred is to be offered at par, pro rata to common shareholders. Holders of 7 per cent preferred are then to be allowed to subscribe for their pro rata of the balance, after which the public will be permitted to subscribe. The company, according to its president, did a gross business last year of $111,000,000. The dividend rate on the new stock of the company is to be fixed at 8 per cent a year and will be cumulative. The company also agrees to redeem it at the rate of 10 per cent thereof each calendar year, beginning with 1919.

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The $10,000,000 two-year 7 per cent secured gold notes of Cities Fuel & Power Company, a Cities Service subsidiary, are being offered at 99 and interest, to yield 7½ per cent. The notes will be dated December 1, 1917, and will be callable in whole or in part on 30 days' notice at 102½ and interest.

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The $1,000,000 7 per cent serial bonds of the Northern Ohio Traction and Light company are being offered at par and interest by the National City Company of New York.

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### Public Utility Dividends.

Southern Utilities Company's board of directors has declared a regular quarterly dividend of $1.75 per share on the outstanding preferred stock for the quarter ending December 31, payable December 31 to stockholders of record at the close of business December 18.

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Wisconsin Edison Company, Inc., has declared a dividend of $1.50 a share, payable December 31 to holders of record December 21. On July 16 last the company paid a dividend of 50 cents a share, a reduction of 50 cents a share as compared with the dividend paid April 15 last.

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Duquesne Light Company has declared a quarterly dividend of 1¾ per cent, on preferred stock, payable February 1 to stock of record January 1.

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Georgia Light & Power Company has declared a quarterly dividend of 1½ per cent on preferred stock, payable January 2 to stock of record December 21.

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Ingersoll-Rand Company has declared a dividend of $10 a share on the common stock, payable December 28 to stock of record December 22. Last April a dividend of $20 a share was declared and last December an equal amount.

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Asheville Power & Light Company declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable January 2 to stock of record December 15.

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Bangor Railway & Electric Company has declared regular quarterly dividend of 1¾ per cent on the preferred stock, payable January 1 to stock of record December 20.

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Boston & Worcester Electric Company declared the usual semi-annual dividend of $1 on the preferred shares, payable January 2, 1918, to stock of record December 22.

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Carolina Power & Light Company has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable January 2 to stock of record December 15.

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El Paso Electric Company has declared the regular semi-annual dividend of $3 on the preferred stock, payable January 14 to stock of record December 24.

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Manila Electric Railroad & Lighting Corporation has declared regular quarterly dividend of 1½ per cent on the common stock, payable December 31 to stock of record December 22.

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Northern Ontario Light & Power Company has declared regular semi-annual dividend of 3 per cent on the preferred stock, payable January 15 to stock of record December 31.

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Southwestern Cities Electric Company has declared regular quarterly dividend of 1¾ per cent on the preferred stock, payable January 2 to stock of record December 15.

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Utah Power & Light Company declared regular quarterly dividend of 1¾ per cent on the preferred stock, payable January 2 to stock of record December 15.

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Yadkin River Power Company declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable January 2 to stock of record December 15.

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Colorado Power Company has declared the regular quarterly dividend of ½ of 1 per cent on the common stock, payable January 15 to stock of record December 31.

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American Public Utilities Company's board of directors has declared the regular quarterly dividend of 1½ per cent on preferred stock, payable January 2, to stockholders of record at the close of business December 20. Transfer books will remain open during the ex-dividend period.

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American Gas & Electric Company declared the regular quarterly dividends of 2½ per cent in cash on the common stock, and 1½ per cent in cash on the preferred stock; also the usual extra semi-annual dividend of 2 per cent in stock on the common stock. The preferred dividend is payable February 1 to stock of record January 18. The common dividends are payable January 2 to stock of record December 18.

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Fort Worth Power & Light Company stockholders have voted to increase the capital stock of the company from $3,860,000 to $4,360,000. The increase is to consist of 5000 shares of preferred stock of par value of $100.

Tampa Electric Company has declared the regular quarterly dividend of $2.50 a share on the capital stock, payable November 15 to stock of record November 9.

### PHILADELPHIA COMPANY.

| For October— | 1917. | Increase. |
|---|---|---|
| Gross | $ 3,171,688 | $ 614,366 |
| Net | 891,184 | *71,649 |
| Jan. 1 to Oct. 31— | | |
| Gross | 20,438,206 | 3,092,086 |
| *Decrease. | | |
| Net | 7,219,057 | *28,499 |

### HAVANA ELECTRIC RAILWAY, LIGHT & POWER COMPANY.

| | 1917 | 1916 |
|---|---|---|
| October gross | $ 635,822 | $ 532,358 |
| Net earnings | 354,135 | 335,153 |
| Surplus after charges | 253,887 | 213,632 |
| Ten months' gross. | 5,672,408 | 4,939,812 |
| Net earnings | 3,205,254 | 3,049,981 |
| Surplus after charges | 2,084,687 | 1,873,723 |

### BRAZILIAN TRACTION, LIGHT & POWER COMPANY, LTD.

Combined earnings, in milreis, of all subsidiaries, compare as follows:

| | 1917 | 1916 |
|---|---|---|
| October gross | $ 8,006,000 | $ 7,262,000 |
| Net earnings | 3,716,000 | 3,900,000 |
| Ten months' gross | 76,436,000 | 70,413,000 |
| Net earnings | 36,884,000 | 38,893,000 |

These figures include earnings and expenses of telephone enterprise recently acquired, the operating results from which for the year 1916 were not brought into accounts until the end of the year.

### FEDERAL LIGHT & TRACTION COMPANY.

Earnings of Federal Light & Traction Company and subsidiaries, inter-company items eliminated, compare as follows:

| | 1917 | 1916 |
|---|---|---|
| October gross | $ 254,713 | $ 201,809 |
| Net after taxes | 70,606 | 79,943 |
| Surplus after charges | 20,097 | 31,235 |
| Ten months' gross. | 2,290,802 | 2,062,032 |
| Net after taxes | 679,128 | 688,865 |
| Surplus after charges | 185,910 | 201,632 |
| Twelve months' gross | 2,730,912 | 2,496,989 |
| Net after taxes | 854,512 | 848,709 |
| Surplus after charges | 139,507 | 146,407 |

### AMERICAN WATER WORKS & ELECTRIC COMPANY.

Earnings of West Penn Railways Company and subsidiaries for October and ten months compares as follows with those of the West Penn Traction Company and subsidiaries for October and ten months, 1916:

| | 1917 | 1916 |
|---|---|---|
| October gross | $ 648,730 | $ 555,786 |
| Net after taxes | 226,712 | 246,015 |
| Surplus after charges | 70,479 | 72,963 |
| Ten months' gross. | 6,312,256 | 5,137,359 |
| Net after taxes | 2,530,604 | 2,446,855 |
| Surplus after charges | 907,175 | 744,169 |

Earnings of West Penn Power Company and subsidiary companies:

| | 1917 | 1916 |
|---|---|---|
| October gross | $ 349,834 | $ 272,744 |
| Net after tax | 98,876 | 118,524 |
| Surplus after charges | 48,849 | 80,180 |
| Balance after preferred dividend | 32,807 | 68,513 |
| Ten months' gross. | 3,211,334 | 2,409,790 |
| Net after tax | 1,049,873 | 1,089,303 |
| Surplus after charges | 639,500 | 709,354 |
| Balance after preferred dividend | 513,938 | 616,021 |

### WESTERN STATES GAS AND ELECTRIC COMPANY

| | Gross | Operating Expenses | Net |
|---|---|---|---|
| October, 1917 | $ 114,652 | $ 70,666 | $ 43,936 |
| Twelve Months | 1,366,862 | 734,442 | 632,420 |
| October, 1916 | 103,274 | 56,560 | 46,714 |
| Twelve Months | 1,226,642 | 639,709 | 586,933 |

### COLUMBUS RAILWAY, POWER & LIGHT COMPANY.

Twelve months ended October—

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $3,932,348 | $3,461,301 |
| Operating expenses | *2,751,229 | *2,039,510 |
| Operating income | 1,181,119 | 1,421,791 |
| Fixed charges | 549,561 | 512,332 |
| Net income | 631,558 | 909,459 |

### COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY.

Twelve months ended October—

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $19,149,110 | $16,518,224 |
| Operating expenses | *11,593,883 | *8,878,592 |
| Operating income | 7,555,227 | 7,639,632 |
| Fixed charges | 5,215,012 | 4,998,342 |
| Net income | 2,340,215 | 2,641,290 |

### UNITED LIGHT & RAILWAYS.

Twelve months ended October—

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $2,044,300 | $1,860,816 |
| Operating expenses | *165,904 | *140,425 |
| Operating income | 1,878,396 | 1,720,391 |
| Fixed charges | 677,177 | 573,644 |
| Net income | 1,201,219 | 1,146,747 |

### NORTHERN OHIO TRACTION & LIGHT COMPANY.

Ten months ended October—

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $5,281,567 | $4,231,007 |
| Operating expenses | 3,273,285 | 2,151,079 |
| Operating income | 2,008,282 | 2,079,928 |
| Fixed charges | 778,822 | 932,340 |
| Net income | 1,229,460 | 1,147,588 |

### RHODE ISLAND COMPANY, PROVIDENCE, R. I.

Ten months ended October.

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $5,035,745 | $4,879,705 |
| Operating expenses | *4,154,210 | *3,490,276 |
| Operating income | 881,535 | 1,389,429 |
| Fixed charges | 1,209,923 | 1,162,614 |
| Net income | †214,560 | †343,925 |

*Includes taxes. †Deficit.

### PORTLAND RAILWAY, LIGHT & POWER COMPANY.

Twelve months ended October—

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $5,895,640 | $5,429,252 |
| Operating expenses | *3,272,373 | *3,043,952 |
| Operating income | 2,623,267 | 2,385,300 |
| Fixed charges | 2,160,703 | 2,178,247 |
| Net income | 462,564 | 207,053 |

### TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS.

Ten months ended October—

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $8,537,793 | $8,441,904 |
| Operating expenses | 5,696,931 | 5,205,673 |
| Operating income | 2,840,862 | 3,236,231 |
| Fixed charges | 1,526,832 | 1,434,878 |
| Net income | 1,314,030 | 1,801,353 |

### BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Ten months ended October.

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $918,957 | $838,272 |
| Operating expenses | *806,073 | *685,433 |
| Operating income | 112,884 | 146,839 |
| Fixed charges | 276,184 | 261,567 |
| Net income | †158,901 | †112,821 |

### CONNECTICUT COMPANY, NEW HAVEN, CONN.

Ten months ended October.

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $8,396,687 | $7,998,519 |
| Operating expenses | *6,595,862 | *5,658,309 |
| Operating income | 1,800,825 | 2,340,210 |
| Fixed charges | 988,995 | 982,848 |
| Net income | †987,948 | †1,583,668 |

### NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

Ten months ended October.

| | 1917. | 1916. |
|---|---|---|
| Operating revenue | $344,993 | $309,869 |
| Operating expenses | *290,633 | *248,538 |
| Operating income | 54,360 | 61,331 |
| Fixed charges | 79,836 | 79,849 |
| Net income | †24,929 | †18,056 |

*Includes taxes.

### WEEKLY COMPARISONS OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

| Public Utilities— | Div. rate. Per cent. | Bid. Dec. 11. | Bid. Dec. 18. |
|---|---|---|---|
| Adirondack Electric Power of Glens Falls, common | .. | 15½ | 13 |
| Adirondack Electric Power of Glens Falls, preferred | 6 | 68 | 70 |
| American Gas & Electric of New York, common | 10+extra | 86 | 85 |
| American Gas & Electric of New York, preferred | 6 | 40 | 39 |
| American Light & Traction of New York, common | .. | 214 | 190 |
| American Light & Traction of New York, preferred | 6 | 93 | 85 |
| American Power & Light of New York, common | 4 | 40 | 45 |
| American Power & Light of New York, preferred | 6 | 72 | 50 |
| American Public Utilities of Grand Rapids, common | .. | 26 | 25 |
| American Public Utilities of Grand Rapids, preferred | 6 | 58 | 56 |
| American Telephone & Telegraph of New York | .. | 101¼ | 97 |
| American Water Works & Elec. of New York, common | .. | 4½ | 4¼ |
| American Water Works & Elec. of New York, particip | 7 | 9 | 8 |
| American Water Works & Elec. of New York, first preferred | .. | 57 | 58 |
| Appalachian Power of Bluefield, common | .. | 2½ | 2 |
| Appalachian Power of Bluefield, preferred | 7 | 18 | 25 |
| Cities Service of New York, common | +extra | 206 | 202 |
| Cities Service of New York, preferred | 6 | 73 | 68½ |
| Commonwealth Edison of Chicago | 8 | 103½ | 103 |
| Comm. Power, Railway & Light of Jackson, common | 4 | 36 | 33 |
| Comm. Power, Railway & Light of Jackson, preferred | 6 | 63 | 63 |
| Federal Light & Traction of New York, common | .. | 1 | 5 |
| Federal Light & Traction of New York, preferred | .. | 28 | 25 |
| Illinois Northern Utilities of Dixon | 6 | 76 | 75 |
| Middle West Utilities of Chicago, common | 2+2 extra | 28 | 24 |
| Middle West Utilities of Chicago, preferred | 6 | 56 | 56 |
| Northern States Power of Chicago, common | ex.div.7 | 63 | 68 |
| Northern States Power of Chicago, preferred | ex.div.7 | 85 | 87 |
| Pacific Gas & Electric of San Francisco, common | 5 | 35 | 31½ |
| Pacific Gas & Electric of San Francisco, preferred | 6 | 80½ | 80 |
| Public Service of Northern Illinois, Chicago, common | 7 | 73 | 73 |
| Public Service of Northern Illinois, Chicago, preferred | 6 | 88 | 88 |
| Republic Railway & Light of Youngstown, common | 4 | 21 | 18 |
| Republic Railway & Light of Youngstown, preferred | 6 | 52 | 52 |
| Standard Gas & Electric of Chicago, common | .. | 4½ | 5 |
| Standard Gas & Electric of Chicago, preferred | 6 | 20 | 19 |
| Tennessee Railway, Light & Power of Chattanooga, common | .. | 2 | 2 |
| Tennessee Railway, Light & Power of Chattanooga, preferred | 6 | 10½ | 10 |
| United Light & Railways of Grand Rapids, common | 4 | 27 | 27 |
| United Light & Railways of Grand Rapids, preferred | 6 | 60 | 58 |
| Western Power of San Francisco, common | .. | 9 | 7 |
| Western Power of San Francisco, preferred | 6 | 40 | 40 |
| Western Union Telegraph of New York | extra | 77 | 78 |
| Industrials— | | | |
| Electric Storage of Philadelphia, common | 4 | 48 | 47 |
| General Electric of Schenectady | 8 | 122¼ | 119 |
| National Carbon of Cleveland, common | 8 | 56 | 56¼ |
| National Carbon of Cleveland, preferred | .. | 130 | 130¾ |
| Westinghouse Electric & Mfg. of Pittsburgh, common | 5+extra | 36¾ | 24½ |
| Westinghouse Electric & Mfg. of Pittsburgh, preferred | 7 | 56 | 57 |

*Last sale.